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II. Fothergill's Spinning machinery; Hopkins' Improvements in Rails; and Shaw's Rotary Engine.

III. Pearse and Child's Apparatus for Making Sugar; Lesnard's Improvements in Generating Steam; Hardy's Machinery for Manufacturing Tubes; and Crampton's Improvements in Making Match Boxes.

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RECENT PATENTS.

To James Fletcher, *of Manchester, in the county of Lancaster, machine-maker, for his invention of certain improvements in machinery or apparatus for preparing, roving, and slubbing cotton, and other fibrous substances.*—[Sealed 22nd May, 1845.]

These improvements consist, firstly, in a novel and peculiar combination of the parts constituting what is known to spinners and manufacturers as the "presser-flyer," which is employed for winding the roving or sliver of cotton, &c., on to the bobbin in the above named preparation processes. The improvement consists in the application to the presser-flyer of a helical wire-spring, which is fixed to a ring or neb at the bottom of the flyer-leg. This ring connects the two legs of the flyer together, in such a manner as to prevent expansion by the action of the presser against the bobbin, or by centrifugal force. The helical-spring may be employed without the ring connecting the two legs of the flyer together, by its application either to the presser, or to a neb fixed on the bottom of the flyer-leg, and acting upon the heel of the presser in such manner as to cause the other end of the presser to act upon the bobbin, with equal pressure from the empty to the full bobbin, so that the bobbin of rovings may be of an equal density or hardness, from the commencement to the full bobbin. The second feature of novelty consists in casting the flyer in moulds or " chills," to dispense with the tedious process of forging them as usual, and forming them afterwards; the flyers will, by this process, be of more equal dimensions and weight, one with another, than when made by the old process of forging, &c. In Plate I, figs. 1, 2, and 3, exhibit the flyer, with the helical-spring *b*, inserted in the inside of a neb or tube, cast upon the edge of the ring *a*, and a small neb or tube *c*, fitting the inside of the helical-spring *b*. The spring being compressed, forces out the small neb or tube *c*, against the heel of presser *d*, and causes it to press against the bobbin *e*, so that the pressure may be made uniform against the bobbin, from the empty to the full bobbin, by the proper formation of the heel of the presser *d*. Figs. 4, and 5, represent the helical-spring *b*, on the outside of the ring *a*, and a small washer or collar *c*, sliding between the compressed helical-spring *b*, and the heel of the presser *d*, which collar causes the presser to act upon the bobbin in the same manner as in figs. 1, 2, and 3. Figs. 6, and 7, represent the helical-spring *b*, inserted in a hollow tube or ring *a*, and having a hoop or washer *c*, on the inside, with a pin protruding through a slot in the ring *a*; against the washer *c*, the compressed helical-spring *b*, acts, and forces the pin against the heel of the presser *d*, by which means a regularity of pressure is obtained, as in the two preceding arrangements. The helical-spring may be applied without using the ring *a*, by having a small tube attached to the bottom of the flyer-leg, and the spring inserted into the tube, in the same way as it is applied to the neb of the ring in figs. 1, 2, and 3;—and further, it may be applied by inserting the spring into a tube on the presser, and having a small neb or table acting on another neb, attached to the bottom of the flyer-leg; the helical-spring being compressed, forces the small table against the neb on the flyer-leg, and causes the presser to act against the bobbin in the same manner as in the other flyers.

The patentee claims, firstly, the application of a helical-spring for giving pressure to the bobbin, either in the different arrangements described and shewn in the drawing or otherwise; and, secondly, casting the flyers of malleable iron, and other metals.—[*Inrolled in the Petty Bag Office, November*, 1845.]

To **Frederic Lesnard**, *of Keppel-street, in the county of Middlesex, engineer, for improvements in generating steam and evaporating liquids.*—[Sealed 29th April, 1845.]

These improvements in generating steam, and evaporating liquids consist in employing a bath of oil or other fatty matter as the heating medium by which water shall be evaporated or converted into steam. In ordinary steam-boilers, the extended surface of the furnace and its flues, with which the water is brought in contact, being exposed to the immediate action of the fire, it will happen, from inattention, or otherwise, that when the water becomes low, little besides steam is left in the boiler, and thus a great chance of accident, either from explosion or collapsing is hazarded, in consequence of the boiler becoming red hot. The object of these improvements, therefore, is to obviate this evil, by employing a bath of fluid matter between the heated surface of the boiler and the water, which shall be capable of communicating the required heat, without exposing the water to the action of the heated metallic surfaces of the furnace or its flues. For this purpose the boiler is charged with fish-oil or other fatty matter, which will retain a much greater quantity of heat before it boils than water; and when the oil or other fatty matter has been raised to a suitably high temperature, jets of water are passed through the fatty fluid, in order to take up the heat, and become converted into steam. These fatty matters, which are insoluble in water, are capable of being heated to such a temperature, as to evaporize water at from 212 to 320 degrees Fahr., without being themselves decomposed. They may even be raised to a higher temperature than this, as the decomposition of fatty substances does not take place until they reach the boiling point, which ranges very much above that of water. The manner of applying this invention to boilers for generating steam, is shewn in Plate III., fig. 1, being a longitudinal section of a steam-boiler, taken vertically through the furnace, and part of its flue. Fig. 2, is a double boiler, the portion A, of which is in transverse section taken at the vertical line Y, Z, of fig. 1, and the portion B, is an end elevation of the front of the boiler. Fig. 3, is a horizontal representation of the double-boiler, the portion B, shewing its upper external surface, and the portion A, being a section taken horizontally in the line W, X, of fig. 1. The boiler may be constructed of plates of metal, bent and rivetted together in the ordinary way of making steam-boilers; but the patentee does not limit himself to any particular form, provided such an one is adopted as may be capable of carrying out the improved mode of generating steam; *a, a,* are the furnaces, furnished with fire-grates *b, b,* and ash-pits *c, c,* below; and *d, d,* are the feeding doors, for introducing the fuel. *e, e,* are flaps for covering the mouths of the ash-pits, in order to damp the fire, but which should be left open when the boiler is in full operation to admit air for supporting the combustion of the fuel. *f, f, f,* are zigzag or contorted flues, passing from the furnaces through and round the boiler, from which the smoke and vapours emitted by the combustion are discharged into the chimney *g*. The lower parts of the boiler at *h, h, h,* may be occupied with water, and upon the top of this the boiler is filled as at *i, i, i,* to about the level shewn in the drawing, with fish-oil, or other oily or fatty matters capable of being rendered fluid. *k, k,* are long flat tubes, extending in horizontal directions through the boilers, from end to end, below the surface of the oil *i, i,* and are perforated with a multitude of small holes, through which the water may escape. These tubes *k, k,* are intended to contain water, supplied by a force-pump *l,* or otherwise, which water is conducted through pipes *m, m,* communicating with the flat tubes. When the oily matter *i, i, i,* in the boiler is heated to a high degree of temperature by the furnace, the pump *l,* is made to force water through the pipes *m, m,* into the tubes *k, k,* from whence it will pass in a multitude of jets through the apertures into the oily fluid, and taking up the heat contained therein, will immediately flash into steam, and rise to the upper part of the boiler *n*, *n*, and into the steam-chamber *p*, from whence the steam will proceed by the pipe *q*, to work a steam-engine, or for any other use. In order to prevent the oily matter *i*, *i*, flowing principally to one side of the boiler, which might occasionally be the case on ship-board, a vertical partition plate *r*, *r*, is placed along the boiler; but it must have openings, as at *s*, *s*, *s*, to allow of the free passage of the steam to the steam-chamber; *t*, is the safety valve, and *u*, is the man-hole for gaining access to the interior of the boiler when it may be necessary to clean it.

The patentee states that he does not confine himself to any particular form of boiler, provided that the construction is such as will admit of water being brought in contact, in jets, with the heated oil, or other fluid fatty matter, so as to generate steam instantly; nor does he confine himself to the position of the jet tubes, as described, below the surface of the heated oil, as an effect of the same kind might be attained by throwing jets of water upon the surface of the heated oil; but he prefers the tube to be immersed.—[*Inrolled in the Petty Bag Office, October*, 1845.]

Specification drawn by Messrs. Newton and Son.

To WILLIAM HATTERSLEY, *of Regent-street, Westminster, piano-forte maker, for certain improvements in the construction of piano-fortes.*—[Sealed 7th April, 1845.]

THESE improvements in the construction of piano-fortes, consist in a peculiar method of strengthening the framing which carries the strings, by the application of metallic elastic trusses; thus enabling the piano-forte maker to overcome the difficulty which has been so generally felt, viz.—the bending of the framing, consequent upon the contraction of the strings. To prevent this bending of the frame, which is exceedingly detrimental to the tone of the instrument, and which frequently starts the joints of the casing, it has been found necessary to increase the strength of the wood bracings to a degree sufficient to resist the pull of the strings; but as the substance and tension of the strings of piano-fortes have latterly been considerably increased, the difficulty of keeping the framing to its original shape has proportionably augmented.

In Plate I., the novel mode of strengthening the framing, which carries the strings of a piano-forte is shewn, as adapted to upright or horizontal instruments. Fig. 1, is a sectional elevation of a cottage piano-forte, with the improvements applied thereto; and fig. 2, is a back view of the same. A, A, is the ordinary framing, which is strengthened; B, B, B, are the braces; and C, C, (fig. 1,) represents the position of the strings, and the mode of attaching them to the top and bottom bars of the framing A, A. It will now be perceived that if the strings contract, they will draw with them the top and bottom bars of the framing, and the vertical braces B, will be brought more or less into the form of a hollow bow or arch.

The continued pull of the wires (generally increased by tuning), has a tendency to increase this bow or arch, therefore, to counteract this tendency of the bracing to bend, metal rods D, D, are applied, which pass over two transverse bars E, E, and enter the top and bottom rails of the framing A, A. One end of each of these rods is furnished with a boss or head, and the other is tapped to receive a nut.—F, is an angle plate, extending along the face and bottom of the lower rail of the framing; and G, is a plate extending along the upper edge of the top rail of the framing. These plates are to receive the strain of the rods D, when they are screwed up to their proper tension by means of the nuts *d.* The whole thus constructed, forms an elastic truss power, the force of which is exerted in counteraction of the pull of the strings. If it should happen to be necessary to increase this counteracting force, it will only be requisite to turn the nuts *d.*

The patentee has not thought it necessary to shew his improvements adapted to a cabinet piano-forte, as the construction is precisely similar to that just explained. It will be obvious, that instead of a nut and screw to tighten the rods, a wedge driven through a mortice-hole in the end of the rod will have the same effect.

The mode of adapting the invention to a "grand" piano-forte, will be seen by referring to figs. 3, and 4; fig. 3, being a plan of the under side of the framing which carries the strings, and fig. 4, a vertical section taken in the line Y, Z, of fig. 3. H, H, is the belly-rail; I, the wrest-block; and *e*, one of the top arches, which connect the wrest-block to the belly-rail and rods D; *f*, *f*, are the under arches which connect the under part of the wrest-block with the belly-rail and rods D.

The adaptation of the elastic trusses to square piano-fortes, or others, in which the bracings are placed diagonally, being very similar to the arrangements above shewn, a further description will be unnecessary.

The patentee confines his claim to the adaptation of metallic trusses, in the manner above described, for the purpose of affording strength, and an adjustable tension, to the frame or bracing and strings of piano-fortes.—[*Inrolled in the Petty Bag Office, October,* 1845.]

Specification drawn by Messrs, Newton and Son.

To BENJAMIN FOTHERGILL, *of Manchester, in the county of Lancaster, machine maker, for an invention of certain improvements in machines called mules, and other machines for spinning cotton, wool, and other fibrous substances.*—[Sealed 8th December, 1842.]

THESE improvements in spinning apply to all that class of machinery called mules, and to all that class of machinery for preparing and spinning, or doubling cotton, flax, and other fibrous substances, in which the spindles recede from, and approach the drawing rollers, and which machines are most commonly known by the names of the mule, stretcher, and turner or doubler. It is considered unnecessary to describe the improvements in reference to any of these machines, except the mule separately; as any mechanic, conversant with the construction of such machinery, will be enabled to construct and arrange the other machines according to the invention. The action or principal movements of the mule, and other machines hereinbefore mentioned, may be divided under three heads. The first comprehends the movements for the delivery of rovings from the drawing-rollers, the receding of the carriage from the drawing-rollers to the extent of the stretch, and the revolution of the spindles in the carriage during its passage along, and after its arrival at the end of the stretch; whereby the rovings are spun with the required number of twists in each thread of yarn. With respect to this class of movements, it is to be observed, that in the self-acting mules, as at present usually constructed and worked, when the carriage has arrived at the drawing-rollers, and at the time when the machine is at rest, prior to its being again set in motion, the faller-wire, by the various means heretofore used, has been raised above the points of the spindles; whereby the yarn is frequently left slack, and forms itself into snarls. The object of the present invention is to prevent such snarls, and this is effected by not allowing the faller-wire to rise, in this state of the machine, higher than that part of the spindle where it last guided the highest coil of yarn on to the partly formed cop, during the inward progress of the carriage. When the machine is set in motion to spin another stretch of yarn, and the carriage is moving out, the faller-wire is permitted gradually to rise until it gets above the spindles, so as to govern or guide the coils of yarn round the bare spindles, from the partly formed cops to the points of the spindles; thereby keeping the yarn at a nearly uniform tension, and preventing it from forming into snarls. The second division of the movements of the mule comprehends the backing off, or removal from the spindles of those coils of yarn which extend from the partly formed cops to the points of the spindles. The third division comprehends the removal of the carriage from the extremity of the stretch to the drawing-rollers, and winding the yarn round the spindles at a regulated tension, so as to form the cops.

In Plate II., fig. 1, represents a side elevation of a self-acting mule, with the improvements attached thereto. Fig. 2, represents a front elevation of the same; part of the head-stock, and of the machinery attached to it being removed, in order that the new parts may be more clearly exhibited. Fig. 3, is a side view of the improvements, detached from the machine, and on an enlarged scale; and fig. 4, is a front view of the same. A, fig. 1, is a spur-wheel, keyed upon the shaft which communicates motion to the whole machine; B, is a bar, with a rack on its upper end, which, when the carriage has arrived at the drawing-rollers, is put into gear with the wheel A; *a*, is a stud, fixed upon the rack-bar B, and which projects from it, and passes through a slot in the lever C. This lever works loosely upon the front roller coupling-shaft, and has a slot at one end, and a weight at the other. *b*, is the lower end of the rack-bar, which is bent, for the purpose of passing under, and supporting the stud *c*, which has a shoulder on one side; and that part of the stud behind the shoulder is made in the form of a screw. The screwed end is passed through a slot in the crank D, which crank is keyed on the faller-shaft, and it is secured to that crank in a position as much nearer to, or farther from the faller-shaft as may be required, by a nut on the screw at the other side of the crank. E, is a cranked-lever, having one arm in a position almost horizontal, and another arm almost vertical. At the upper end of the vertical arm is a projecting catch, with an inclined plane running from the extremity of the catch, and terminating at the top of the arm. When the stud *d*, and that end of the lever C, upon which it is fixed, is depressed by the rack-bar B, the stud presses against the inclined plane of the catch, on the upright arm of the lever E, and when it has got below it, the gravitation of the lower part of the arm draws the catch over that stud, and holds it, and the lever to which it is attached, in that position, until the stud *e*, which is fixed to the carriage, elevates the lower arm of the cranked-lever E, and thereby liberates the stud *d*, and lever C: *f*, is a section of part of the carriage-frame. E, (figs. 2, 3, 4,) is a cranked-lever, which works on a stud *g*, fixed to a support *h*, which is bolted to the head-stock. On the cranked-lever F, two friction-pulleys *i*, *j*, are fixed; the pulley *i*, has two flanges, one at each side, between which the bar B, works, and is held in a vertical position; the pulley *j*, is acted upon by the cam or tappet G, and forces the rack B, into gear with the driving-wheel A. Those parts of the machinery which are not described, are well known to the makers of such machines, and to spinners or operatives who superintend or work them.

Having described each part of the improvements separately, and exhibited the application of his improvements to the self-acting mule, the patentee proceeds to shew the manner in which they act, when the machine is at work. When the carriage is up to the drawing-rollers, and the machine is set in motion, the bottom of the faller-wire is on a level with the top part of the partially-formed cop. The faller-wire has a constant tendency to rise, by weights or springs being attached to an arm or pulley on the opposite side of the faller-shaft, in the usual manner. As the carriage commences to move outwards, and the spindles to revolve by the ordinary machinery, the faller-wire is allowed to rise gradually by means of the rack-bar B, (fig. 1,) being depressed by the wheel A; the stud *c*, which rests upon it, and the crank D, to which the stud is attached, fall at the same time, and in the same degree, whereby the yarn, which would otherwise be slack, is wound round the bare spindles to their points. The toothed part of the bar B, being forced down by the rotation of the wheel A, the plane surface of the bar above the rack will be opposite the wheel A, and presenting no resistance thereto, will become stationary, and be held down by the catch on the lever E, which passes over the stud *d*, on the lever C. By the bar being depressed to this point, the faller-wire is elevated above the points of the spindles, and continued in that position until the carriage arrives at the end of the stretch, where the usual movements of the machine take place.

After the backing-off motion has ceased, the faller-wire is lowered to the bottom of the conical base of the cop, as the carriage moves inward, in the ordinary manner. When the carriage has reached within a short distance of the drawing-rollers, the improvements again come into operation, by the stud *e*, elevating the lower arm of the cranked-lever E, and thereby liberating the lever C, the weight upon the opposite end of which raises the crank-bar B, until it comes in contact with the stud *c*, on the crank *d*, attached to the faller, and is held there until the carriage arrives at the drawing-rollers: when the carriage has arrived at the drawing-rollers, the mechanism for putting the mule again into motion, turns the cam or tappet G, (fig. 2,) against the friction-roller *j*, and by means of the friction-roller *i*, on the same lever, forces the rack on the bar B, into gear with the wheel A, and the operations before described are thereby recommenced.

In conclusion, the patentee declares his invention to consist in the arrangement and application of the several mechanical contrivances above described, when combined with the machines hereinbefore mentioned, by which contrivances the yarn is prevented from snarling; whether the effects are produced as described, or by any similar or equivalent contrivances; and he also declares, that he does not claim the exclusive use of any of the several things or apparatus hereinbefore mentioned or referred to, except when applied to the purposes of the said invention.—[*Inrolled in the Inrolment Office, June,* 1843.]

To JULIUS ADOLPH DETMOLD, *of the city of London, merchant, for improvements in the construction of metallic boats, and other vessels having curved surfaces,—being a communication.*—[Sealed 24th May, 1845.]

THIS invention of improvements in the construction of metallic boats, and other vessels having curved surfaces, consists in bending sheets of metal into any required form (which they shall permanently retain), without stretching, or materially changing the thickness of the metal; by the employment of peculiarly shaped dies, suitably mounted, and worked by hydraulic or other power. In making boats according to this invention, sheets of metal are brought into the form of the sides, or parts of the side of a boat, by subjecting them to great pressure between concave and convex moulds or dies, shaped according to the fashion of the boat to be constructed. Upon the convex die ribs or raised surfaces are formed, and in the concave die are depressions, corresponding exactly with the ribs on the convex die, or *vice versâ*. The width, curvature, and length of these ribs, and their number, and distances apart, will be regulated according to the surplus metal resulting from the change of a plane or flat surface (the form of the sheet of metal, before being operated upon) to the curved surface which the metal is caused to assume in forming the irregular curves in the different parts of the boat; the object being to take up, or form into ribs, the metal which would otherwise wrinkle, and buckle up irregularly during the compressing operation, and at the same time to afford strength and stiffness, wherever it is required, in the sides of the boat.

The manner in which these improvements are carried into effect, will be more clearly understood by reference to the drawings in Plate I., fig. 1, being an elevation of a pair of dies, mounted in suitable frame-work, and intended to form the side of a boat, and fig. 2, an end elevation of the same. A, is the convex die, and B, the concave die. *a, a, a,* are the ribs, or raised surfaces, and *b, b, b,* the corresponding depressions. C, C, are standards or strong frame-work, which support the dies, and the other parts of the machinery. D, and D^1, are cross-heads, connected together by rods E, E, and between these the dies are placed. Upon each of the lower cross-heads D, (see fig. 1,) an hydraulic press F, is affixed, which, by its action, forces up a longitudinal beam G, which carries the concave die B. The upper die A, is attached, by bolts or otherwise, to a longitudinal beam H, which is itself supported by iron straps and cross-pieces, attached to a cross-bar of the frame-work C, and carries the upper cross-heads D^1. It will now be seen that if a sheet of metal is placed between the dies, and the power of the hydraulic press is applied to bring them together, the sheet will be made to take the shape of the dies, without any important straining or attenuation of the metal. For the gunwale there is a reverse rib and flange, to give stiffness to the side at that part, as is represented at a^1, a^*, fig. 3, which is a section of a pair of dies for forming that part of the boat. Fig. 4, represents in edge view a pair of cast-iron dies; the convex die being in three pieces A, B, and C. The side-pieces B, and C, are attached to the centre-piece A, by screw-bolts *c*, but they are allowed to move upwards, and act upon the plate, independently of each other, by slots being provided in the side-pieces, as shewn by dots in the figure. After the sheets are brought to the required shape, they may be attached to a common keel of wood or iron from stem to stern. From the above description it will be evident, that if the dies are varied in shape, and provided with ribs and grooves capable of taking up or crimping those portions of the sheet metal which are not wanted for forming the surface of the vessel to to be constructed, this process may also be applied for producing any vessels, whether for navigation or otherwise, if such vessels are to be made from sheet metal.

The mode of actuating the dies, and the arrangement of the machinery generally, may be varied according to circumstances or convenience; but that which the inventor considers new, and desires to secure, is corrugating plates, or sheets of metal, for forming boats, and other vessels, having curved surfaces, so that the corrugations shall take up the metal not required to be brought into the contour of the vessel; by which means irregular curves of great strength may be readily and economically produced.—[*Inrolled in the Petty Bag Office, November,* 1845.]

Specification drawn by Messrs. Newton and Son.

To Simon Snyder, *of the city of Dayton, in the State of Ohio, United States of America, mechanic, for improvements in tanning hides and skins.*—[Sealed 28th June, 1845.]

This invention consists in preparing hides and skins for being tanned, by making, either on the flesh or grain side, a great number of indentations or small holes through them, in order that the tannin may enter more freely and perfectly into the hides and skins; the chief object of the invention being to expedite the process of tanning.

The most proper time for performing the operation of perforating or puncturing, is when the hide or skin is in its most relaxed state, being the last time it is worked out of the "bate" or "grainer," and just before introducing it into the tan-liquor; but it may be perforated at other stages of the cleansing or tanning process. The holes or indentations may be made by a hand instrument, with a surface of steel points, to be applied to the hide or skin, and caused to penetrate by pressure, or by striking with a mallet; or the perforations may be formed by passing the hide or skin under or over a cylinder or flat surface, covered with steel points, to the number of from 100 to 300 to the square inch.

The patentee claims the preparation of the hides or skins to be tanned by puncturing or perforating them either partly or entirely through, so as to admit the tannin more freely and perfectly to penetrate and operate upon the hides or skins.—[*Inrolled in the Inrolment Office, December,* 1845.]

To JOSEPH MALCOLMSON, *of Portlaw, in the county of Waterford, Ireland, for improvements in apparatus used for propelling carriages on roads, and vessels on inland waters, when employing atmospheric pressure.*—[Sealed 12th July, 1845.]

THIS invention relates to improvements in atmospheric propulsion: the first part consists in laying down a close pipe, distinct from the ordinary traction-pipe, along the whole length of the line of railway, and causing it to communicate with the air-pumps at each station. The patentee prefers that this communication should be uninterrupted throughout the whole line (but in some situations, where a higher or lower vacuum is required, a portion of the pipe may be shut off from the rest); and the steam-engines, water-wheels, or other machines, will then work conjointly in creating and maintaining a vacuum in the close-pipe. The traction-pipe is divided, by transverse valves or slides, into suitable lengths, as usual; and these lengths or divisions are connected at each end, with the close-pipe, by branch-pipes, furnished with valves. When a train is required to start, a communication is established between the first length or division of the traction-pipe and the close-pipe, by opening the valve in the branch-pipe farthest from the station, and a vacuum being thereby created in the first division, the travelling piston will move onwards with the train. Previous to a train passing over a length of the traction-pipe, the next length should in like manner be brought in connection with the close-pipe, so that when the travelling piston arrives at the end of the first length, it may move onwards without stopping.

The second improvement relates to the construction of the pipe employed in any system of propelling by atmospheric pressure for establishing a communication between the traction-pipe and the engines. The patentee prefers that the pipe should be circular, although other shapes may be used; and he also prefers to construct the same as a culvert, with such materials as may be most convenient, say, bricks, tiles, earthenware, slate, masonry, or stone, and in some situations timber may be employed. The outer surface is covered with any suitable caulking material which will be impervious to the atmosphere, such as asphaltum or bitumen, Jeffery's marine glue, India-rubber, tar, pitch, Roman-cement, puddle, &c. The patentee also proposes to use for this purpose earthenware-pipes, or draining-tiles, or glass-pipes, which will only require to be caulked at the joints.

These improvements may also be employed when propelling vessels on inland waters by atmospheric pressure.

The patentee claims, Firstly, the adoption of a close-pipe, independent of the travelling-pipe, connecting the air-pumps along the line, so that they may be kept continually and unitedly at work in creating and upholding a vacuum in the said pipe—under such arrangement the engines or other motive power may be placed farther apart, and may be of less dimensions than usual, by which a saving of first cost and fuel is effected, and also the necessity of duplicate engines at each station will be avoided, as if any engine becomes deranged, the others will be capable of performing the work. He claims, Secondly, the modes of constructing and applying pipes, above described, in all systems of propelling by the pressure of the atmosphere, where pipes are used for communicating a vacuum, and through which it may not be required to pass the propelling apparatus.—[*Inrolled in the Inrolment Office, January,* 1846.]

To Peter Rothwell Jackson, *of Strawberry Hill, near Manchester, in the county of Lancaster, engineer, for certain improvements in the construction and manufacture of wheels, cylinders, hoops, and rollers, and in the machinery or apparatus connected therewith; and also improvements in steam-valves.*—[Sealed 24th February, 1844.]

These improvements in the construction and manufacture of wheels, cylinders, hoops, and rollers, and in the machinery or apparatus connected therewith, consist, firstly, in the application or employment of the ordinary machine or engine, known to engineers and machinists as the "vertical wheel cutting-engine," (that is, a machine or tool for cutting or forming the teeth or cogs of spur or bevil-wheels), or a portion of such machine, or any similar arrangement of machinery, to the purposes of moulding or forming toothed wheels in the sand, prior to casting the same in metal. In order that the novel and peculiar application of this machine to the purposes required may be perfectly understood, the patentee first describes the general construction and arrangement of the working parts of an ordinary wheel cutting-engine, known as the vertical machine. In the common upright wheel cutting-engine, the wheel under the operation of cutting is placed on a table or spindle, with its axis vertical, in which position it is capable of being turned round its axis entirely, or any space or portion of the circle the operator may think fit. The wheel being thus placed, a revolving cutter or tool, running in suitable bearings, fixed to a sliding plate, is brought down and passed through that portion of the rim or periphery of the wheel which is intended to be cut or formed into teeth or cogs, and thus a space is cut out between the two teeth or cogs, which having been done, the cutter is withdrawn by means of the vertical slide. The operator now turns the table as far as required by the pitch of the intended teeth or cogs, (in doing which he is guided by the dividing-wheel or plate), when the slide and cutter are again brought down to act upon the rim of the wheel, and thus cut out another space; the same operation is repeated until the toothed wheel is entirely formed, by cutting out the spaces, and leaving the series of teeth or cogs complete, the metal or timber left between the spaces made by the cutter forming the teeth or cogs of the wheel. When mitre or bevilled wheels are intended to be cut or formed by this machine, the plate upon which the tool-slide moves is set to suit the angle or direction which the cogs or teeth are required to take.

The application of part of this machine to the moulding or forming of toothed wheels in the sand, to be subsequently cast in metal, is thus described:—To prepare a mould for casting a spur-wheel, a moulding-box is placed upon the table or spindle, where the wheel to be cut would otherwise be placed, and attached to the slide-plate, instead of a cutter, is a pattern or model of a small segment of the rim, with its cog or cogs, of the wheel intended to be cast. This pattern is brought down, by means of the slide, to within a short distance of the bottom of the moulding-box; a quantity of sand is then put into the box, and pressed or rammed around the segment or pattern, in the usual way of moulding. The segment or pattern is now withdrawn, by means of the slide of the machine, or otherwise, until the pattern is above the surface of the sand, when the table is turned, and the segment is brought down again, and sand pressed or rammed around it, so as to form a continuation of the mould already made; care being taken at the said time not to disturb the portion of the mould formed by the previous operation: this operation must be continued until the pattern has been entirely carried round, when the mould for the wheel will be completed. The mould, thus formed, may now be removed to any convenient place for casting, or the cast may be made upon the table of the machine; after which it may be dressed in the usual way, and will then be ready for use.

For moulding cylinders, hoops, pulleys, or plain wheels, such as fly-wheels, as well as for various other similar descriptions of work, instead of placing on the slide a segmental pattern, with cogs, a pattern of the form of a portion of the article required to be moulded is attached thereto. The formation of the arms of the wheel, where desired, may also be effected in the usual way, by removing, or otherwise dispensing with, the sand from the interior of the mould, and inserting cores therein of a proper form, and at such a distance from one another, that the spaces between any two of such cores will be equal to the thickness of the arms required. The mould having been covered with a top moulding-box rammed with sand, or a plate covered with loam, or in any other way which the moulder may think best, the metal may be cast in such mould. For moulding some descriptions of bevil-wheels with this machine, the slide will require to be set in the direction or angle of the bevil, in a similar manner to what is common in cutting bevil-wheels; and if the segment should consist of more than one cog and its rim, it will be necessary, in such cases, to have the segment divided between the cogs, in such a way that each cog, and its proper portion of segment or rim attached to it, may, when required, be drawn out of the sand separately, in the correct angle of the intended bevil-wheel, and thus avoid a difficulty which is generally found in drawing bevil-wheel patterns out of the sand when the teeth are what is called "under-cut," that is, when the cogs are thinner near that part that is attached to the rim or segment than at the pitch-line or circle. It will be evident, that for many castings the moulding may be performed with sufficient accuracy, by the use, simply, of a radial arm in combination with the slide working round its centre, without the dividing-plate and its arrangement of wheel-work; but for casting cog-wheels, it is much preferable that the dividing-plate or wheels should be added, as perfect accuracy in the moulding may thus be secured.

Secondly.—This invention consists in a novel arrangement and application of apparatus to connect, disconnect, and drive shafting, wheels and other machinery or apparatus having rotary motion. To illustrate it, the patentee describes the arrangement as applied to start, drive, and stop a wheel loose upon a revolving shaft. The rim of the wheel must be made to project beyond the boss and arms or disc on one side, and must be bored or turned true internally. On that part of the shaft which lies under the projecting rim of the wheel, one two or more hydraulic cylinders, provided with rams and leathers or stuffing-boxes, similar to those used in "Bramah's hydraulic presses," are fitted. These cylinders are placed with their axes at right angles to the axis of the shaft, and under the projecting rim of the wheel, and where more than one is used, they are best placed at equal distances round the shaft. The rams are made convex at their outer ends, or have a cap fitted on them, to correspond with the inner side of the projecting rim, so that, when it is desired to set the wheel in motion, the rams are driven outwards from the cylinders against the inside of the rim, with a force sufficient for the power to be driven by means of such wheel. In this arrangement the water or other fluid, or elastic vapour to be employed, is conveyed from a pipe, working in a stuffing-box at the end of the shaft, through a hole in the shaft into the cylinders; and on pressure being applied to the water, the rams will be forced outwards into contact with the bored part of the wheel-rim, and the wheel will begin to revolve (the pressure being, in all cases, proportioned to the power required to be driven by the wheel); and when it is desired to stop or disconnect the wheel, the pressure of the water is removed, upon which the wheel will cease to revolve. To facilitate the withdrawal of the faces of the rams from the inner rim of the wheel, when the water-pressure is removed, small springs are attached to the under side of the rams in the cylinders, the elasticity of which, when the water-pressure is withdrawn, will suffice to draw back the rams to their proper position in the cylinders, and thus prevent the friction which would take place if they continued in contact.

In some situations it may be inconvenient to introduce the water through the pipe and stuffing-box, fitted into a hole at the end of the shaft, as would be the case with a wheel to be started in the middle of a long range of shafting; and in such cases the following modification is adopted:—Upon the shaft underneath the bored rail of the wheel the cylinders are fixed, as before described, and at a convenient distance from those cylinders, and on the same shaft with them, an additional cylinder, with stuffing-boxes, is formed, having its axis through and at right angles to the axis of the shaft, and communicating, by means of a hole bored along the shaft, with the under side of the rams, as in the former illustration. This additional cylinder extends or projects equally on each side of the shaft, and is fitted with two rams, one for each end of the cylinder, with a space between the two for water or other fluid. One ram of the additional cylinder having been put into its place, water is introduced above it, and by means of the hole along the shaft into the other cylinders, after which the top ram of the additional cylinder is put into its place. The outer ends of the two rams are at opposite sides of the shaft, and project beyond the cylinder sufficiently to be formed into screws, which work in bushes in the centre of two bevil-wheels, say *a*, and *b* : one of such rams working in the bush of the wheel *a*, and the other of the wheel *b*. Two other bevil-wheels, say *c*, and *d*, are fitted to run loose on the shaft, and are each brought into gear, at opposite sides, with the two wheels *a*, and *b*. It will be evident, that to effect this, the two wheels *c*, and *d*, on the shaft must be of equal size, and those on the rams *a*, and *b*, must also be of equal size, and all four must be of the same pitch. Each of these wheels must also have a guard to keep them in their places, and the guard for each of the wheels *a*, and *b*, working on the rams must also be fitted with a key, to keep the ram from turning in the cylinder, when brought into action.

The action of this apparatus is as follows:—The shaft is supposed to be running, and the wheel intended to be started to be at rest. The four bevil-wheels, *a*, *b*, *c*, and *d*, have at this time no revolution round their several centres, but are carried round with the shaft, and it is desired to communicate a driving power to the wheel at rest. To effect this, one of the two bevil-wheels upon the shaft, say the wheel *c*, is held by hand, or by means of a break, for which a preparation must be made on those wheels, and that wheel *c*, immediately ceases to go round with the shaft, and causes the two wheels *a*, and *b*, on the ram ends, with which it is in gear, to revolve round their axes, and thereby force the rams into the cylinders, and thus apply pressure to the water therein, and in the cylinders under the rim of the wheel to be driven, until a sufficient pressure is obtained. So soon as this is effected, the hand or break, as the case may be, is withdrawn from the bevil-wheel *c*, upon which the wheels *a*, *b*, and *d*, cease to revolve round their axes, and all the four bevil-wheels again go round with the shaft; thus preserving the pressure in the cylinders, and the communication of the driving power to the wheel. To take off the pressure, and bring the wheel which is being driven to a state of rest, the other bevil-wheel *d*, on the driving shaft, must be stopped in the same manner as *c*, when the ram bevil-wheels *a*, and *b*, will be driven in a contrary direction round their axes, and thus raise the rams on the additional cylinder, and remove the pressure on the fluid, and the driving power from the wheel.

A further mode of communicating power to a wheel is shewn by the application of the last arrangement of bevil-wheels *a*, *b*, *c*, and *d*, as follows:—The wheels are arranged as before, but placed under the projecting rim of the wheel to be driven, and the action of the wheels reversed, so that when one of the wheels, say *d*, is stopped, the action of the wheels *a*, and *b*, propel the rams or screws outwards against the inner rim of the wheel to be driven: the rams or screws, in this case, being each furnished with a cap or face to fit to the concave segment of the rim against which it is pressed. In this plan no hydraulic pressure is employed, the only action being that produced by the revolution of the wheels *a*, and *b*, and the pressure, by means of the cap or head of the screws, against the inner side of the wheel-rim. The wheel will be disengaged, as in the former illustration, by stopping the opposite wheel *c*, by the hand or break, when the face or cap of the screws or rams will be withdrawn from the inner side of the wheel-rim by the action of the bevil-wheels *a*, *b*, running in the contrary direction to that in which they revolved to start the wheel.

The patentee states, that it will be evident numerous modifications in the arrangement of the parts may be suggested and practised in his various improvements, without departing from the spirit of the invention: as, for instance, where adapting his principle of hydraulic pressure, variations may be made by fitting the cylinders upon the wheel, and forcing the rams against the shaft; by changing the position of the cylinders and rams with respect to the shaft or wheel; and in the different modes of procuring and removing the hydraulic pressure—also in cases where hydraulic pressure is not employed, changes may be made in the arrangement of the bevil-wheels, and their application, to produce the connection and disconnection of machinery and shafting, by means of screws or rams and other apparatus, without hydraulic pressure, upon the principle hereinbefore illustrated; and in the employment of worm or other wheels for the same purpose, in minor details unnecessary to describe: various fluids or elastic vapours may also be employed, as well as water in the cylinders.

A further improvement consists in the application of an article of commerce now well known by the name of guano, as a substitute or material to be employed in the hardening of hoops, cylinders, rollers, and wheels, and also the faces and the levers for steam-valves and other apparatus, in which great hardness of surface and durability is desired, in place of the bone dust and other matters now commonly employed in such or similar processes.—[*Inrolled in the Petty Bag Office, August,* 1845.]

Specification drawn by Messrs. Newton and Son.

To JAMES HARDY, *of Birmingham, in the county of Warwick, Gent., for his invention of improvements in the manufacture of metallic tubes or pipes by machinery.*—[Sealed 5th June, 1845.]

THE object of these improvements in the manufacture of metallic tubes or pipes, is to effect the rolling of the skelp, when brought to a welding heat, with such expedition that the metal shall not cool before it is welded into a pipe or tube, and brought to the required diameter.

To complete this operation at one heating, the patentee has found it desirable that the rotation of the rollers should be continuous, as much time is lost by the ordinary plan in stopping the rollers after the skelp has been drawn over the bulb of the mandril and between the grooves of the rollers, in order that the mandril may be released, and drawn out from the skelp or partly formed tube, which is again to be passed between the rollers, to receive the squeezing pressure in the grooves. One mode of effecting the return of the skelp or unfinished tube, without stopping the revolution of the rollers, is described in the specification of a patent granted to the present inventor March 28th, 1844*, in which three grooved rollers are arranged one above the other, and the skelp, when drawn over the bulb of the mandril, and placed between the middle and lower rollers, is raised, together with the mandril, by an arm or lever, in order that it may be subjected to the second squeezing operation between the upper and middle rollers, which will return it to the front of the rollers, ready to be passed through the next adjoining set of grooves.

By the present invention, the third grooved roller is dispensed with, as is also the lever and apparatus connected therewith, for lifting the unfinished tube and its mandril, as just stated, and the welding and drawing out of the tubes is completed without displacing the mandril.

In Plate III., several views of the improved machinery to be employed in the manufacture of metal tubes or pipes are shewn. Fig. 1, is a front elevation, and fig. 2, a side elevation of the same. A, A, are strong cast-iron standards, which support the bearings of a pair of rollers B, B, furnished with grooves, varying in diameter according to the size of tubes required to be made, and having keyed on their shafts a pair of cog-wheels, which gear into each other, and cause the rollers to revolve simultaneously. C, shews one of a series of mandrils, the bulbs of which protrude through the circular openings between the rollers. The other ends of the mandrils rest upon a framing D, and being provided with set-screws 1, 1, the distance which the bulb protrudes from the grooves of the rollers B, is regulated according to the grip desired to be given to the skelp or tube. E, is a horizontal shaft, one end of which is supported by a bearing F; its inner end is provided with a square socket, which fits upon the shaft of the lower roller B. Upon the horizontal shaft E, two bevil-wheels G, and H, are loosely mounted; and between them is a clutch-box I, and lever (see the partial plan view, fig. 3), which slides upon a feather-edge on the shaft E, and is for the purpose of locking into the teeth on the boss of either of the bevil-wheels, as may be required. Rotary motion is communicated, by means of a bevil-wheel K, to both the loose wheels G, and H; and as the clutch-box I, is slidden by its lever from the right to the left, and *vice versâ*, the rotation of the grooved rollers will be reversed. The lower roller B, is provided with a raised portion between the grooves; which projections fit into corresponding recesses between the grooves of the upper roller, and are for the purpose of steadying the rollers when at work, by which means a more perfect circular compression of the skelp or tube is effected. *a, a,* are screws, in the head of the standards, for adjusting the bite or pressure of the rollers.

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* For description of this Invention, see Vol. 25, Conjoined Series, p. 310.

The following is the mode of forming metal pipes and tubes by this improved machinery:—A piece of iron or steel, of any given length, breadth, and thickness, is first obtained, and having formed it into a skelp by any of the ordinary means, it is placed in a furnace, where it remains until it has attained a welding heat. When the required heat is obtained, the skelp is removed from the furnace and pushed over the bulb of that mandril which projects, say from the largest diameter of groove in the rollers B; then, by throwing the clutch-box I, into contact with the teeth on the boss of the bevil-wheel G, the rollers will be caused to rotate and grip the skelp, which is drawn between the grooves and over the mandril, and pushed out on the other side of the machine. The skelp having thus undergone a rolling pressure on its whole outer surface, and the welding together of the edges being partially effected, it is (immediately it has become released from the rollers) turned round a quarter of its diameter, more or less, and the clutch-box I, is then thrown into contact with the teeth on the boss of the wheel H; by which means the rotation of the grooved rollers B, will be immediately reversed. The tube thus partially welded is again brought into contact with the rollers, and passed through the grooves, and a different surface being now presented to the surface of the grooves, as above stated, any inequality in the first rolling, or any fin or other excrescence on the outer surface of the tube will be removed. When the tube has been subjected to this second pressure, it may (if required) be passed, in like manner, through the other grooves of the rollers, and be extended in length, and reduced in diameter and thickness, as is well understood.

The patentee states, that the economy of time, in manufacturing metal pipes or tubes, according to this mode of operating, will be evident to all persons connected with such manufacture. In conclusion he adds, that he is enabled to weld and make both lap and butt-joint tubes or pipes with equal facility; and also to weld, form, and make tubes or pipes from spiral strings or narrow strips of twisted metal.—[*Inrolled in the Petty Bag Office, December,* 1845.]

Specification drawn by Messrs. Newton and Son.

To THOMAS RUSSELL CRAMPTON, *of* 2, *Southwark-square, Southwark, in the county of Surrey, engineer, for improvements in match-boxes, or articles to be used in the production of instantaneous light, and in the machinery for manufacturing the same.*—[Sealed 12th July, 1845.]

THIS invention consists in manufacturing boxes for containing matches out of clay or cement, by pressure in a mould.

In Plate III., fig. 1, is a vertical section of the apparatus employed for the above-mentioned purpose. *a,* is a mould of a cylindrical form; *b,* a piston or plate, fitting accurately therein; *c,* a perforated plate, fitting the top of the mould; and *d,* a disc or plate (an underside view of which is represented at fig. 2), with a number of tapering steel spikes or pins *e,* projecting therefrom, corresponding in number and diameter to the perforations in the plate *c.*

The operation of making the boxes is as follows:—The plates *c,* and *d,* being removed from the mould *a,* the latter is charged about two-thirds full with clay; the plate *c,* is then secured on the top of the mould, by the fastening shewn at fig. 3, or other convenient means, and the plate *d,* is made to descend, so that its spikes shall penetrate through the plate *c,* to the required depth in the clay; any surplus clay being at the same time pressed out through small openings *f*, formed around the upper part of the mould. After this the plate *d*, is withdrawn, the plate *c*, unfastened from the top of the mould, and the piston *b*, forced up with the moulded clay thereon;—the holes *g*, relieve the lower part of the mould of any clay which may pass the piston *b*. The boxes, thus formed, are baked, and may be afterwards furnished with lids or covers of the ordinary kind.

The material which the patentee employs for making the boxes is potters' clay; but he does not confine himself thereto, as, in some cases, cements in a semi-liquid state might be employed.

The patentee claims the making of boxes for containing matches for producing instantaneous light by means of pressure in a mould, as above described, by any well-known mechanical power; such boxes being formed of clay, or cements, or similar materials.—[*Inrolled in the Inrolment Office, January,* 1846.]

To HENRY PEARSE, *and* WILLIAM DIMSDALE CHILD, *both of Finsbury-place, South, in the city of London, for improvements in the manufacture of sugar,— being a communication.*—[Sealed 21st August, 1845.]

THE first part of this invention relates to the heating of the vacuum pans used for evaporating the clarified syrups; steam has been hitherto used for this purpose, but the present improvement consists in heating them by means of the hot air and vapours passing off through the flues of the teaches or pans.

In Plate III., fig. 1, is a longitudinal section of a set of teaches or pans, filters, clarifiers, &c., with this invention applied thereto; and fig. 2, is a plan view of the same. A chamber *a*, is constructed for receiving the vacuum pan *b*, which is now deprived of its bottom casing, or steam jacket. The hot air and vapours which pass off from beneath the teaches *c*, are conducted by the flues *d*, into the chamber *a*, and thence to the chimney *e*; or beneath the clarifiers *f*, in the first instance, and then into the chamber *a*; or they may proceed direct from the teaches to the chimney;—the course of the hot air and vapours is regulated by dampers *g*.

The second improvement consists in so combining two or more filters, that the filtered product from the first may flow into the one next below, and from the lowest into one of the teaches or pans; the filtering medium consisting of horse-hair, wool, and cotton. The bottom of the upper filter is composed of copper wire-cloth or other suitable material, on which horse-hair is spread, and upon the horse-hair a moveable frame of wire-cloth or other suitable material is placed: there may be also a perforated wooden bottom to the vessel, to support such filtering medium. The second filter is constructed in a similar manner, except that coarse wool is substituted for the horse-hair. The third filter is also made like the first, but cotton is used instead of horse-hair. The filters (marked *h*,) are supplied by the pump *i*, and pipe *j*, and the filtered product descends from the lowest filter into one of the teaches.

The third improvement consists in dispensing with the arches of masonry hitherto used in setting the teaches or pans, and employing metal supports instead. The teaches are connected by saddle or pannier-pieces of metal *k*, which are supported by bars extending across the furnace, and the flue is closed in by masonry, so that the parts of the teaches which were heretofore covered by the arches of masonry are thrown open to the heat in the flue, and thus a more extensive heating surface is obtained.

The patentees claim, Firstly,—the mode of heating vacuum pans by the hot air passing off through the flues of the teaches or pans, as above described, and which would otherwise be wasted. Secondly, the mode of arranging filters for filtering sugar in the process of manufacture, as above described. Thirdly, the mode of setting teaches or pans by dispensing with arches and using metal, as above described.—[*Inrolled in the Inrolment Office, January,* 1846.]

To James Thompson, *of Cornwall-road, Lambeth, baker, for certain improvements in the preparation and application of various farinaceous products, and for machinery used in manufacturing the same.*—[Sealed 20th December, 1844.]

This invention consists in improvements in preparing flour and other products from potatoes, and in the machinery for manufacturing the same.

The potatoes are steeped in water for five or six hours, and then thrown into a cylinder (composed of a number of wooden bars, an inch or two apart), revolving in a trough filled with water. By the revolution of the cylinder, the potatoes are freed from dirt, and from the greater portion of their skins; the dirty water runs off through an outlet in the bottom of the trough, while a continuous supply of clean water is kept up from a pipe overhead. After this, the potatoes are reduced, by rasping, to a fine pulp, the fibrine contained in which is then separated from the starch, by subjecting it to a number of washings in cylindrical sieves of metallic gauze: the starch passes through the sieves in solution, and the fibrine, or the greater portion thereof, remains in the sieves. Common salt is added to the starch liquor, in the proportion of about one ounce to each gallon of the liquor, which has the effect of throwing up any small particles of fibrine that may not have been separated by the preceding operation; and from the purified starch liquor a fine flour is obtained, by subsidence, re-washing, drying, sifting, &c., as practised by manufacturers of potato starch. The fibrine is converted into yeast, by first subjecting it to great pressure, to expel the water; it is then dried, and ground into meal; this meal is mixed with a decoction of hops, and the mixture is strained and left for a short time to ferment, when it becomes converted into yeast, suitable for baking and other fermenting purposes.

The potato flour is used for improving the quality of bread, by adding to the liquor used in making the dough about one or two pounds of the potato flour for each sack of wheat flour employed; or the potato flour may be made into a jelly with boiling water, and worked up with the dough,—this addition causes the bread to keep sweet and moist, much longer than usual, and prevents it from crumbling. Potato flour is also mixed with the ingredients used in making pastry in about the same proportion as for bread; and it causes the article so made to be much lighter than usual. A fancy cake may be made with potato flour alone, and without butter, by beating up the yolk of eggs with sugar, thickening with potato flour, flavouring with citron or lemon, and then baking it.

The patentee claims, Firstly, the washing and peeling of the potatoes by means of an open-ribbed cylinder, revolving in water, as above described. Secondly,—the preparation, in the manner above described, of the fibrine of the potatoes, after its separation from the starch, and its application to the manufacture of yeast. Thirdly,—the application of potato flour, prepared as aforesaid, to the improvement of bread and pastry.—[*Inrolled in the Inrolment Office, June,* 1845.]

To JOSEPH CLIFF, *of Wortley, in the county of York, fire-brick manufacturer, for certain improvements in the manufacture of alum, and of aluminous compounds, from a substance not hitherto used for that purpose, and in the production of an improved fire-clay from the residuum thereof.*—[Sealed 5th June, 1845.]

THIS invention relates to such fire-clays as contain a great quantity of alumina, especially the "Wortley fire-clay." The improvement consists in extracting the whole or the greater part of the alumina therefrom, and converting it into alum and aluminous compounds, and in using the purified clay, either alone or combined with other fire-clay, for making fire-bricks, glass-house pots, crucibles, gas retorts, and similar articles.

The Wortley fire-clay, or any other fire-clay containing alumina in excess, is first ground, then calcined, and afterwards submitted to the action of sulphuric, nitric, muriatic, or other acid, more or less diluted with water, and with or without the assistance of heat. The mass being lixiviated with water, the alumina is obtained in solution, and this solution is freed from iron by the employment of prussiate of potash, gallic acid, sulphuretted hydrogen, or some other suitable agent. The patentee now either evaporates the solution by itself, to get the sulphate, nitrate, or muriate of alumina, according to the acid used; or he mixes the sulphate or muriate of potash, soda, or ammonia with the solution, and evaporates and crystallizes the same, to obtain the alum salts, and then, by roaching, the alum of commerce is formed. After the whole or the greater part of the alumina has been extracted, as above described, the purified and residuary earth may be employed, alone, or combined with other clay, in the manufacture of fire-bricks, glass-house pots, crucibles, gas-retorts, and similar articles.

The patentee claims, Firstly, the extraction from fire-clays of the whole or part of the alumina contained therein, previous to the application thereof to the making of fire-bricks and other like fire-resisting articles. Secondly, the manufacture of alum and aluminous compounds from the Wortley fire-clay, before mentioned, or any other fire-clay containing alumina in similar abundance. Thirdly, the application of the residuum of such fire-clays, by itself, or in combination, in any proportion, with Wortley or any other fire-clay in its native state, to the making of fire-bricks, glass-house pots, crucibles, gas-retorts, and other like articles.—[*Inrolled in the Inrolment Office, December,* 1845.]

To JOHN HOPKINS, *of Brand-street, Greenwich, in the county of Kent, surveyor, for certain improvements in rails and trams for railroads and tramways.*—[Sealed 3rd July, 1845.]

THE object of this invention is to employ rails, trams, or continuous surfaces of wood, upon which the wheels of engines and carriages may travel as on the ordinary rails or trams.

In Plate II., fig. 1, is a transverse section of one of the rails; *a,* is a frame of iron or other metal, bolted to the sleeper *b;* in this frame a block of wood *c,* is placed, and is secured therein by the bolt *d,* and nut *e; f,* represents part of the tire of a railway wheel, resting upon the wooden rail *c.* Fig. 2, is a modification of fig. 1; instead of the frame *a,* two angular pieces of iron *g, g*^{1}, are bolted to the sleeper, the piece *g*^{1} being higher than the other, to prevent wheels without flanges from running off when the rail is used as a tram; the wooden rail *c,* is situated between the angular pieces *g, g*^{1}, resting upon the sleeper *b,* and is retained in its place by the bolt *d.* Fig. 3, is another modification; in this the wooden rail is contained in a metal frame *h,* one side of which is raised above the other, for the same purpose as the piece *g*^{1}; *i,* represents part of the tire of a wheel, without a flange, similar to those used on common roads. Fig. 4, shews another modification; the rail *c,* is, in this instance, wedge-shaped, and is contained in a metal frame *j,* of a corresponding shape; the wooden blocks are inserted into the frame at one end, and driven in until the frame is full;—if preferred, one side of the frame may be raised above the other, as indicated by the dotted lines, for the purpose before mentioned. An adhesive composition or cement may be used in some cases, to secure the wooden blocks in the frames.

The patentee claims, as his invention, the application of blocks or surfaces of wood, placed and fastened in frames of iron, either with the grain of such wood downwards or otherwise, in the manner shewn, for the purpose of forming or constructing rails, or trams, or continuous wooden surfaces for railroads and tramways, and on which rails or trams the peripheries of the wheels of the carriages or other vehicles travelling or running shall travel or run on blocks or surfaces of wood, in the manner shewn. But he does not confine himself to any particular form or size of blocks or surfaces of wood, or to any particular form or size of such frames of iron.—[*Inrolled in the Inrolment Office, January,* 1846.]

To JOHN SHAW, *of Broughton-in-Turness, in the county of Lancaster, chemist and druggist, for a hydro-pneumatic engine.*—[Sealed 12th July, 1845.]

THE description of this invention is so vague, that we consider it advisable to insert the specification *verbatim,* in order that our readers may interpret for themselves the meaning of the patentee. The drawings representing the engine will be found in Plate II.

"Figure 1, A, B, is a cylinder, with two revolving ends, C, C;—F, is an axletree, to which the ends are fast, supported and running in the two pillars, G, G;—D, D, D, D, are tubes, running through air-tight collars, obliquely through the ends, and fast to the arms M, M, M, M, of the axle-tree; L, is a tap or valve, to let water in at pleasure; R, is a force-pump, to pump the water out again; H, is a small air-pump, to be wrought by the turning of the axle-tree F.

"Fig. 2, represents the ends where the tubes run obliquely through into the inside of the large cylinder in the direction represented, and fast to the arms, so that when the tubes pull, the arms turn. Thus, to shew it at work, through L, fill the large cylinder with water, then shut the tap or valve, and, with the pump R, bring part of the water out, which will leave a vacuum, except the water which is not elastic, when the external pressure of air will press the tubes D, D, D, D, internally, consequently pulling the arms M, M, M, M, of the axle-tree, they must turn, which also carries the ends C, C, as they are fast. Thus, the continuous pull upon the arms, the axle-tree F, goes round with them, when one air-pump will keep up the vacuum, if any air rushes in with friction, and the crank at D, will turn any other machine required."—[*Inrolled in the Inrolment Office, January,* 1846.]

To Christopher Nickels, *of York-road, Lambeth, in the county of Surrey, Gent., for improvements in binding and covering books, pamphlets, portfolios, writing-cases, and other similar articles.*—[Sealed 20th May, 1845.]

These improvements in binding and covering books, pamphlets, portfolios, writing-cases, and similar articles, consist in the employment of gutta-percha, in various states, instead of some of the materials hitherto used for such purposes.

The different modes of employing the gutta-percha are five in number. First, it is used in a state of solution, to cement together at the back the sheets of books and pamphlets, previous to being boarded or covered, instead of sewing and glueing or stitching the same. The process followed is similar to that adopted in caoutchouc bookbinding: the sheets are first cut into single detached leaves, by running a ploughing-knife along the folds, or they are made up into double leaves, with a single back-fold; the volume of leaves is roughed at the back, by rasping; and the back then receives one or more coats of the gutta-percha solution. Sometimes, to obtain greater strength, the patentee places over the coating of gutta-percha a strip of cotton, linen, or other cloth, a little wider than the back of the volume, cementing it thereto by a thin solution of gutta-percha; or before the coats of gutta-percha are applied, pieces of cord, about twice as long as the back of the volume is broad, are inserted in transverse grooves, made at equal distances in the back by a fine saw: the overlapping parts of the strip of cloth, or the projecting portions of cord serve to connect the back to the boards, as in ordinary bookbinding. The solution of gutta-percha employed is obtained from the native substance, after it has been cleansed and dissolved by the processes described in the specification of a patent granted to Richard Archibald Brooman, March 11th, 1845. The solution should, in most instances, be applied warm, and one coating allowed to dry before another is added, or before any material is placed upon it.

Secondly, a solution of gutta-percha is used as a substitute for paste, size, gum, or glaze, wherever the same are ordinarily employed in any of the processes of binding and covering, other than that before described: as in pasting the end-papers and joints, attaching leather or vellum to the boards and backs, or sizing for marbling and gilding.

Thirdly, a solution of gutta-percha is employed as a vehicle for colors in coloring and marbling the edges and covers of books, pamphlets, portfolios, &c.

Fourthly, gutta-percha is used in the sheet state as a substitute for vellum, leather, paper, and cloth, in binding and covering books, pamphlets, &c. The gutta-percha is employed in the plain sheet state, as it is manufactured under Brooman's patent, and afterwards ornamented; or it may be previously prepared and figured for the express purpose, by pouring a solution of gutta-percha upon an engraved surface, allowing it to dry, and then stripping it off; or the sheets may be previously prepared and figured by the granular process, described in the specification above-mentioned; or compound sheets of cloth and gutta-percha may be made, by covering the cloth with a layer of gutta-percha in the plastic state, or with several coats of a solution thereof.

Fifthly, the patentee employs as a substitute for pasteboard, in binding and covering the articles aforesaid, a composite material, consisting of gutta-percha mixed with paper-pulp or leather-dust, or of bats or fleeces of wool, cotton, or other fibrous material, cemented together by gutta-percha, according to the methods described in Brooman's specification.

When a greater degree of flexibility than that which the gutta-percha naturally possesses is required, a small quantity of caoutchouc is mixed with it, in the proportion of one part of the latter to four of the former.

The patentee claims the employment of gutta-percha for binding and covering books, pamphlets, portfolios, writing-cases, and other similar articles, in the various states and combinations, and according to the various modes and forms above described.—[*Inrolled in the Inrolment Office, November,* 1845.]

To John Leifchild, *of the Minories, in the city of London, blue manufacturer, for improvements in the manufacture of blue, to be used as a substitute for stone-blue.*—[Sealed 8th July, 1845.]

This invention consists in combining certain descriptions of blue color, known as Chinese blue and Turnbull's blue, with oxalic acid, so as to render them suitably soluble in water, in order that the combined matters may be used instead of stone-blue, for coloring linen after washing.

The mode of operating is as follows:—Four parts, by weight, of Chinese blue, one of Turnbull's blue, and one of oxalic acid are well mixed together, and boiling water is gradually added, until the whole is dissolved; and then to this combination an addition is made of one part, by measure, of the liquid called sulphate of indigo, which is produced by mixing one part of indigo with four parts of concentrated sulphuric acid, and afterwards neutralizing the excess of acid by means of carbonate of ammonia. The combined liquid, when required for use, is reduced in intensity of color, to the extent desired, by the addition of water; it is then ready to be employed for blueing linen after washing, as hitherto practised when stone-blue in water has been used.

The patentee states, that he does not confine himself to the compound or combination above given; and that it is not absolutely necessary to employ both the Chinese blue and Turnbull's blue, nor to combine the sulphate of indigo therewith, although he believes it to be preferable under all circumstances; and other coloring matters may be added, if desired.

He claims the combining oxalic acid with those qualities of blue known as Chinese blue and Turnbull's blue, with a solution of indigo; and also the combining that quality of blue known as Chinese blue, or as Turnbull's blue, with or without a solution of indigo.—[*Inrolled in the Inrolment Office, January,* 1846.]

Scientific Notices.

ON THE APPLICATION OF THE MANURE CONTAINED IN THE SEWAGE WATER OF LONDON TO AGRICULTURAL PURPOSES.

The growing conviction of the necessity for proper drainage to secure the health and comfort of the inhabitants of large towns, and the increasing desire of agriculturists to improve the quality of their lands, so as to produce crops equal to the demand of home consumption, appears to have revived a proposition which was long since made, viz., to draw the products of the metropolitan sewers into one general conduit, and, in various ways, apply the manure thus obtained to the purposes of agriculture. Setting aside the enormous quantity of liquified animal and vegetable matter lost by the present plan of our sewerage, estimated at 265,142 tons per diem, it will readily be allowed that, by an artificially low drainage (by which we mean a drainage under low-water mark), a greater fall might be given to the sewers, and thus not only the lowest portions of the town would admit of thorough drainage, but also the solid matters which deposit themselves in the sewers, and cause such nauseous effluvia to arise, after heavy rains or during dry weather, would be carried off by the more rapid flow of the water. A very ingenious mode of clearing the sewers has lately been partially adopted, and with great success. It consists in forming flushes or reservoirs to collect a large body of water, which, at certain periods, is allowed to escape. By this means a sudden rush of water is created, which carries forward any matter deposited in the sewers, and sweeps it into the river.

Although it must be acknowledged that great improvements have been effected, of late years, in draining generally, and more particularly in the formation of the main sewers, recently completed in London, it must still be felt that much is wanting to be done, while so much matter, which, when properly applied, is eminently productive in fertilizing the soil, should be allowed either to flow away in boundless profusion, or stagnate and poison the people it might be the means of preserving from famine.

We have been led to these remarks by the appearance of a pamphlet, emanating from Mr. Wicksteed, the engineer of the "London Sewage Company;" and purporting to be a Report upon the various plans proposed for rendering available the manure contained in the sewage water of the Metropolis, but which, in fact, is intended to demolish a rival scheme, brought forward under the auspices of Mr. Smith, of Deanstone.

The first proposition for merging all the sewers in a general conduit originated, we believe, with Mr. Martin, the artist. An account of this gentleman's plan, illustrated with drawings, was published in one of the Parliamentary Reports on Metropolitan Improvements. The principal feature of the scheme was the construction of a large sewer along each bank of the Thames, and into these sewers all the drains and smaller sewers, which at present have an outlet to the river, were to discharge themselves; their contents being conveyed by these large sewers to the Isle of Dogs, on the one side, and, on the other side of the river to some similarly convenient spot, where it was intended to separate the solid matters from the aqueous particles, either by filtration, deposition, or some other suitable means. A further feature in Mr. Martin's plan was the construction of an embankment upon the large sewers; and over the landing wharfs he proposed to build a viaduct or roadway, whereby the principal thoroughfares which run parallel, or nearly so, to the river, would be relieved of some of their traffic. We are not aware that any steps were taken to bring this scheme before the public as a commercial speculation; but from its costliness, it was condemned as wild, the extent and grandeur of the plan being little suited to the penurious and jobbing style of Metropolitan improvements.

The rival schemes, which have lately been submitted to the public, both embrace the proposal of taking the sewage water and employing it as a manure; but their mode of effecting this object is entirely different. The "Metropolitan Sewage Company," with which Mr. Smith, of Deanstone, the well-known agricultural engineer, is connected, states, in its prospectus, that "a plan has been long since formed, which has undergone the consideration of practical and scientific men, and the result is that a complete scheme has been matured for conveying the sewage water of London, by means of a system of pumping-engines and pipes, analogous to that of the great water companies, and thus distributing the fertilizing fluid over the land in such manner and proportions as may be adapted to the various kinds of field and garden cultivation." In another place, the prospectus says:—"The contents of the sewers will be raised by powerful steam-engines, and distributed by pipes over an area of sixty square miles. A sum of £300,000 only will be required to carry this part of the plan into effect."

We cannot but coincide in the opinion of Mr. Wicksteed, that the "practical and scientific men" have made a material error in their calculation, and have considerably underrated the costs of supplying sixty square miles, especially if the country is hilly, which would, of course, involve the necessity of greatly increasing the power, and consequently the cost, of the pumping engines and other machinery, in order to force the water to a considerable altitude above the reservoir or sewer which brings the water to the engine. After due consideration of this liquid manure scheme, our doubts, as to its feasibility and practicability, have rather increased than diminished, in spite of the strong array of names that are published as guarantees of advantages, commercially speaking, that would result from its adoption. It must be manifest to any person capable of judging of these matters that, under the most favourable view of the case, the number of consumers of the liquid manure must necessarily be extremely limited, and cannot, by any possibility, be extended, except by an enormously increased outlay for laying down additional service-pipes. Besides, how can the Company ensure customers sufficient, within the required limits, to take their liquid manure; and, furthermore, it must be remembered that, although the supply of liquid manure or sewage water amounts to the quantity as before stated, of 265,142 tons daily, it cannot, by any possibility, be made use of as it is drawn off, for not more than from six weeks to two months in the whole year is devoted to manuring land. How, then, does the Company purpose to dispose of their valuable commodity, and in what manner store it up until the time for manuring arrives?

The projectors of this scheme are evidently wanting in information in the principles of hydraulics, for it being settled that a given power will propel a given weight of water a certain distance, they seem to have overlooked the ratio in which the friction and weight will increase with every addition to the length of the supply pipes or mains.

Mr. Wicksteed, the hydraulic engineer, who, from his great experience and long connection with water companies, must be considered as fully equal to his subject, states in his Report to the "London Sewage Company," that, after giving the subject his best attention, he is decidedly of opinion that no plan of distributing the sewage water as liquid manure through pipes, by means of pumping-engines, can ever be made to answer in a commercial point of view; and to back his opinion, he enters very minutely into the question, and points out the practical difficulties in the way of its accomplishment.

The plan which Mr. Wicksteed advocates, in some measure assimilates to that formerly projected by Mr. Martin, for he proposes to collect the sewage water by means of a large main sewer, and carry it down to the marshes in the vicinity of Barking Creek, where the solid matters that are in mechanical suspension are to be allowed to subside, and then the supernatant liquor pumped into the Thames. The principal difference between these plans is, that instead of constructing a sewer along the banks of the Thames, Mr. Wicksteed intends to construct a circular sewer of eight feet diameter, to extend from the Ranelagh-sewer, at the end of Grosvenor-road, to pass underground, in an easterly direction, through Grosvenor-road, Grosvenor-street West, Lower Grosvenor-place, Stafford-row, James-street, York-street, Tothill-street, Westminster Abbey-yard, King-street, Whitehall, Strand, to the end of Fleet-street; then increasing the sewer to twelve feet in diameter, he continues it across Farringdon-street, through Ludgate-hill, the south side of St. Paul's Church-yard, Watling-street, Budge-row, Cannon-street, Eastcheap, Tower-street, Tower-hill, East Smithfield, Parsons-street, Ratcliffe-highway, Commercial-road, East India-road, under the Lea River, and from thence, in a straight line, through the West Ham Marshes, to the works of the Company, proposed to be situated in an angle formed by Barking Creek and the River Thames,—the whole distance being about eleven and a half miles. When the sewer is completed, the existing sewers are to be diverted into it by means of shafts, extending from the under side of the old sewers to the top of the new or intercepting sewer; by this means no lodgment or stoppage can take place in the old sewers, as the whole of their contents must be emptied into the new one. As a reason for not adopting a plan similar to that proposed by Mr. Martin, Mr. Wicksteed says:—"To have carried the intercepting sewer along the banks of the Thames, at, and in front of the mouths of all the existing sewers, would have involved an enormous expenditure, and great uncertainty, whilst the plan now proposed involves only the diversion of the present sewers between the intercepting sewer and the river (should it be considered requisite), in order that the sewage from the houses in that space may flow into the intercepting sewer instead of into the river."

By this it will be seen, that Mr. Wicksteed puts forth as his reasons for preferring a land sewer, "the enormous expenditure and great uncertainty" attendant upon a sewer along the banks of the river. Now, although the formation of a sewer along the river will certainly involve the necessity of constructing a series of coffer-dams to keep out the water while the works are in progress, yet Mr. Wicksteed's plan can only be carried out by that most expensive of all engineering works, tunnelling; added to which, he will have to reconstruct all the sewers between his intercepting sewer and the river, as their present inclination will be in the wrong direction. The advantage, therefore, in point of economy, with regard to the engineering works of the two plans, is not quite so evident as might be desired by the supporters of the new scheme.

The arrangements for obtaining the fertilizing matter in a solid form from the sewage water, are described in the Report, which says:—The main sewer will terminate in a receiving reservoir, in the Barking Marshes, in which it is intended to separate any heavy materials, such as stones, brickbats, and the carcasses of animals, or other floating bodies, that may be carried down from the sewage water. Bricks, stones, and other similar bodies, will be taken out at once; the floating bodies will be raised into a separate reservoir, and subjected to the action of lime, to promote their decomposition. The sewage water will be continually pumped up into other reservoirs, as it flows out of the mouth of the sewer, so as always to preserve a fall of water in the sewer. The sewage water is mixed with lime, which will prevent any effluvium from extending beyond the works, and when it is pumped up into the reservoir, it is allowed to rest. When the solid parts have settled, the supernatant liquor is either pumped or run off, and the deposit removed and dried by artificial means; it is then compressed and packed up for transmission, by land or water, to any part of the world. The proportion of fertilizing matter found to exist in the sewage water of London, is 1 in 236, which will give about 410,000 tons of solid manure, per annum. The solid matter thus obtained is found, by analysis, to be equal in value, as a manure, to the best guano, which sells at from £8 to £10 per ton. It is not, however, anticipated that the manure obtained from the sewage water will sell for anything near these prices, as the amount that will be produced will so much exceed the present demand, in the neighbourhood of London, that some time must necessarily elapse before such an enormous quantity will find a ready sale, even at a very low price.

In calling attention to this subject, it has not been our intention to shew the advantages of one Company over the other, as a profitable investment of capital, our opinion being that such vast improvements as are contemplated are little suited to the management of private speculators; but it must be evident that, leaving their relative practicability out of the question, the solid manure scheme has decidedly the advantage considered commercially, as its market is so much more extended than the liquid manure scheme; it being a matter of comparative indifference to the one, whether the neighbouring agriculturists make use of the manure or not, as it can, at a small expense, be conveyed hundreds of miles away; whereas, with the other, it is a question of life and death, whether consumers of the liquid manure can be found, and that in certain specified localities, where supply pipes have been laid down.

The advantages which will result to the Metropolis, and particularly to poor neighbourhoods, from the adoption of some good and practicable plan of drainage, are so great, that it is high time the matter was properly set on foot in higher quarters; but if, from the consideration of more important subjects, this sanatory measure should be neglected, we shall hail with pleasure the progress of any private company which may lay the foundation for the proposed improvements.

(Extracts from Foreign Journals, translated for this Work.)

ON THE EMPLOYMENT OF AMMONIACO-MAGNESIAN PHOSPHATE AS MANURE.

BY M. BOUSSINGAULT.

Ammoniaco-magnesian Phosphate contains the elements which appear to be the most necessary for the development of plants; it also possesses one of the properties belonging to gypsum, viz., a very slight degree of solubility.

On the 1st of May last, the author put a quantity of arable earth into stone-vessels capable of containing about nine square feet. These vessels were divided into two series; sixteen grammes of ammoniaco-magnesian phosphate were added to the earth contained in each of the first series, and in all the vessels a quantity of maize or Indian corn, which had already germinated was planted. All the vessels were placed out in the open air, and watered with an equal quantity of water when requisite.

During the first fifteen days after rising above the ground, all the plants presented the same appearance and vigour; it was only after the twenty-fifth day that a difference was perceived, and which subsequently continued.

On the 25th July, the sprouts of the first series, which had been treated with the phosphate, were twice as high and three times as thick as those which had risen from the unprepared earth.

On the 25th August, these proportions were different; the blades of the first being half as long again, and twice as thick as the second.

All the blades were in ear at the same time; those which had been treated with the double salt bore three ears, two perfect and one imperfect, and the others only one perfect and one imperfect ear. The grain of the first weighed more than that of the second, in the proportion of 2¼ to 1.—[*Bulletin de la Société d'Encouragement.*]

NEW APPARATUS FOR EXTRACTING THE COLORING MATTER FROM DYE WOODS,

COMMUNICATED TO THE SOCIETY OF INDUSTRY BY M. IWAN SCHLUMBERGER.

At a meeting of your committee of chemistry, I communicated the advantages which I had found in the apparatus of Mr. Meissonnier for extracting the coloring matter of logwood. Some members appearing to doubt the real merit of this apparatus, or not having produced results analogous to mine, on trying it, I made some fresh experiments, which I explained to your committee of chemistry, accompanied by calculations which any other persons might make.

It is of some of these experiments I am now about to speak.

In order to make decoctions of logwood, the usual method is to put a quantity of shavings of that wood into a boiler in immediate contact with the fire, together with a quantity of water, sufficient to cover the wood completely, so that after boiling for some hours the wood may be quite covered. The operation is renewed twice with the same liquor, and after three successive boilings, the decoctions are mixed together and evaporated to the degree required.

This operation is attended with several disadvantages. Shavings only can be employed, for if the logwood is reduced to powder, it absorbs so much water that a great quantity of liquid is lost, and the shavings being rather thick, the water cannot readily penetrate, for which reason the time of boiling is very much prolonged.

Notwithstanding these three long boilings, if the same wood be boiled a fourth time, a liquid pretty well colored is obtained; which clearly shews that all the coloring matter has not been extracted.

Besides this, when decoctions of logwood are required in large quantities, very large vessels and extensive premises are necessary, as well as several furnaces, in order to produce a sufficient quantity: for the wood, when in shavings, is very bulky without being heavy, and large boilers are required for making a decoction from 50 lbs. of shavings, with the necessary quantity of water. Several boilers must therefore be employed, otherwise the fire must be kept up day and night.

I will here describe, *en passant*, for the benefit of those persons who have not many furnaces, but who have a steam-pipe at command, a method which I have employed for some time to make decoctions in great quantities, and which I think I can recommend in this instance.

A large high narrow vat, capable of containing about from 100 to 150 lbs. of wood shavings, is mounted upon a stand or framing, and furnished with a cock below, in order to draw off the liquor. At a short distance above the cock, inside the vat, a false bottom or diaphragm, pierced with holes very close to each other, is fixed, in order to leave a space at the bottom to prevent the wood from clogging up the cock, and stopping the flow of the liquor. A steam-pipe, about one-third of an inch in diameter, is carried to the bottom of the vat, which is filled with shavings. It is covered with a cloth and a cover, which is weighted, in order to prevent the steam from issuing out in too great abundance. The shavings must not be heaped up more than in the common boilers. In this state, steam is allowed to flow in for an hour at least, until it escapes out in moderate quantities at the top. During this time the wood swells and becomes penetrated by the steam; then when the vat is filled with water, it will be sufficient to heat to the boiling point, in order to obtain, the first time, a strong decoction. The vat is afterwards filled twice in succession, and made to boil as usual; and in the same space of time, with less labour, a much larger quantity of decoction is obtained, and much more coloring matter extracted.

By the two methods just mentioned, considerable time is required for each operation, and the wood is not entirely exhausted of coloring matter; but with M. Meissonnier's apparatus much more advantageous results are attained.

This improved apparatus consists of a copper boiler of about a foot and a half in width, and about two feet in depth. At a short distance from the bottom of the boiler is a false bottom, pierced with a multitude of holes, which sustains the wood in the water, and leaves an empty space for the boiling liquor. Into the boiler powdered wood is thrown, and it is covered first with strong wire-work, and then with a copper-plate, pierced with small holes, which cover is held firmly down upon the edges of the boiler by any suitable means. At the side of the boiler is a small lift and force-pump, simply constructed, which draws the boiling water from any suitable vessel, and forces it through a pipe into the empty space at the bottom of the boiler. The water after passing through the wood and the pierced cover of the boiler, is run off into any suitable receiver.

In our manufactory, at the side of the pump is a boiler, heated with a coal-fire, capable of containing 450 quarts of water which is to be boiled for each operation. After filling it, and lighting the fire, the other boiler is filled with powdered logwood, spread as evenly as possible, until it contains from 84 to 90 pounds of wood. The water having arrived at the boiling point is then forced into the space at the bottom of the vessel containing the dyewood, and driven up through the wood. In this manner, in two hours, the 450 quarts pass through and extract all the coloring matter from the dyewood.

The liquor which has passed through the wood is divided into three distinct portions,—in this manner: a first portion of the decoction may be 3½° Beaumé; a second, 1½°; a third, ½°; and lastly, a fourth portion of liquid very slightly colored, which may be mixed with the water for the next operation. In this manner the most advantageous results are secured, as three decoctions of different degrees of strength are obtained at one working, without evaporation.

When a second operation is not commenced immediately, the waste heat of the furnace is employed to concentrate the liquor.

I will compare the advantages of this apparatus with that which we were obliged previously to use.

Thus, in a boiler heated by fire, 140 pounds of shavings and 80 quarts of water were put, and the liquor was boiled for four hours: this was renewed three times. For 40 pounds of logwood, it was, therefore, necessary to boil 240 quarts of water for twelve hours. I double these quantities the better to compare them with those produced by the new apparatus. Thus, by the old method, for 80 pounds of wood it was necessary to boil 480 quarts of water during twenty-four hours.

By the novel method, when from 84 to 90 pounds of wood are operated upon, two hours are necessary for heating the 450 quarts of water, and two hours for pumping it through the wood. Therefore, for 84 pounds of wood, it will be necessary to heat 450 quarts of water for four hours, effecting an economy of fuel for twenty hours' consumption.

Besides this, the coloring matter is better extracted, and a great economy of labour is effected, as one man can effect two operations per diem.

Several precautions are necessary, in fact indispensable, to ensure complete success; for instance, the wood must be very evenly spread, in order that the resistance offered to the water may be equal throughout: and, for this purpose, the wood must be put into the vessel in small quantities at a time. A very important point is, to have the wood ground or rasped of a uniform size, without fine dust, as the particles of this latter are apt to adhere together, and offer great resistance to the water at certain parts; thus preventing the coloring matter from being extracted therefrom. I have found that the wood spreads much better by previously wetting it.

For some other woods, such as Lima and Pernambouc woods, and other red dyewoods, 600 quarts of water, instead of 450, must be employed, as the coloring matter is not so easily extracted. Quercitron cannot be operated upon, as it is too fine a powder. Cochineal does not succeed, as it swells so much on coming in contact with boiling water that, in an experiment I made, I thought it would have burst the boiler.

This apparatus is, however, very advantageous for the woods above-mentioned, if the directions given are carefully followed.—[*Bulletin de la Société Industrielle de Mullhouse.*]

REPORTS OF AMERICAN PATENTS.

From the "Journal of the Franklin Institute."

EDITED BY DR. THOMAS P. JONES.

To CHRISTOPHER WEST, *of Baltimore, Maryland, for an improvement in the lamp for burning camphine or turpentine.*

Two rings are put on the wick tube, one at the bottom, and the other within $\frac{1}{16}$th of an inch from the top. These rings are equal in thickness, and form a space for the reception of the usual cloth conductor, over which the wick is put, and the space between the wick and the tube above the upper ring forms a receptacle for catching the gum, &c., arising, as it is said, from the burning of camphine or turpentine.

Claim:—"What I claim as my invention, and which I wish to secure by letters patent, consists in the combination of the rings, with the tubes, in the manner and for the purpose above specified."

To R. F. LOPER, *Philadelphia, Pennsylvania, for an improvement in the coupling and stuffing box for shafts, specially intended for submerged propellers for ships.*

THE outer tube of the stuffing box, instead of being permanent, is tapped into a metallic casing surrounding it so as to admit of screwing it over the lapped or other joint of the shaft, so that when this tube is drawn in, the two shafts can be separated, and if desired, the propeller drawn up out of the water; and when screwed out, passes over and prevents the two shafts from being separated.

Claim:—"Having thus fully described my improvements, what I claim therein, and what I desire to secure by letters patent, is the before described mode of employing the cylindrical tube for the double purpose of a coupling box and stuffing box, by combining it with the coupled shaft and with the other portions of the stuffing box; by which arrangement much room is saved, and great simplicity attained—all as herein described."

To FRANKLIN ROYS, *Berlin, Hartford County, Connecticut, for an improvement in the machine for cutting bread.*

THIS is a modification of the knife used in the shops for cutting chewing tobacco, one end of which is jointed to a standard, and the other guided by sliding in a slot in another standard. The improvement in question is for giving to the knife a drawing cut, by making an elongated hole in the jointed end, which slides on a pin, and having a brace jointed to the back of the knife and the standard—the handle end being guided in the usual manner.

Claim :—" What I claim as my invention, and desire to secure by letters patent, is the stud, with the slit to guide the knife perpendicularly,—the brace applied to the knife to give the drawing stroke or cut, and the slit in the end of the knife.

REPORT OF TRANSACTIONS OF THE INSTITUTION OF CIVIL ENGINEERS.

(Continued from page 456, Vol. XXVII.)

Sir JOHN RENNIE, *President*, said, that the Institution was much indebted to Mr. Guppy for the paper which had induced, in the course of the discussion, the expression of the opinions of the good authorities who had spoken on a subject of such great importance.

The advances made in steam navigation were already very great, but he anticipated much greater would result from the application of the screw-propeller. The best forms, not only of propellers, but of the vessels to which they could be most advantageously applied, would be more accurately ascertained from the experiments now in progress, by the order of the Government, and also by private individuals; he hoped the Institution would soon be put in possession of the result of these, by the same spirit of liberality as had induced Mr. Guppy to present his paper.

A very interesting communication might be produced, by tracing the progress of steam navigation for the last few years, taking, for instance, one station, that of Dover, where, it would be recollected, with the old vessels 8 or 9 knots an hour was considered a good speed, but, at present, with better shaped vessels and more powerful engines, a speed of nearly 15 knots per hour was stated to have been attained.

Mr. P. Taylor said, that great difference of opinion existed among the officers of the French navy as to the capabilities of the 'Napoléon.' It had been asserted, that with the peculiar build and great proportion of power to tonnage of that vessel, greater speed should have been attained. Mr. Taylor was not of that opinion, although he fully appreciated the build of M. Normand's vessel, and the excellence of Mr. Barnes' engines. He had paid much attention to the result of the voyages of the 'Napoléon,' and found them, on an average, more rapid than those of the paddle-wheel vessels on the same station. The screw did not generally make such good way in smooth water, but with a sea or wind sufficient to lay a paddle-wheel ship at all over, the screw gained immensely, and hence its average superiority.

After the trial voyages, and the run from Havre to Marseilles, with the cast-iron screw, which had been mentioned at the Institution on a previous occasion; it was found, on putting the 'Napoléon' into the graven dock at Toulon, that the outer journal of the propeller-shaft was much worn; and that the cast-iron screw was much affected by galvanic action; a new bronze screw was therefore cast, and was highly polished and varnished, before it was fixed. At the same time, the bearing areas, of both the outer and the inner journals of the shaft were increased, and a jet of cold water was arranged so as to be constantly applied to them. Since these alterations, there had not been any undue wearing of the journals.

Mr. Barnes would not venture to state the relation of power to tonnage, on board the 'Napoléon,' as the methods of measurement of vessels was quite illusory. The engines were 130 H. P. The vessel was 148 feet 6 inches long, and 27 feet 4 inches broad at the water line, drawing 11 feet 10 inches aft, and 7 feet 5 inches forward, and the area of the midship section at that draught was 144 square feet. By the ordinary rules of measurement, the tonnage would be 490 tons, and the displacement, 365 tons.

He had made many engines for vessels built by M. Normand and he knew their capabilities. He was of opinion, that if the feathering paddle-wheels, invented by M. Cavé, had been adapted to the 'Napoléon,' as good speed would have been attained, as with the screw, in all weathers; but that with the common paddle-wheels, such results could not have been arrived at.

Mr. F. P. Smith had found, with reference to the journals of the propeller-shaft, that steel was the best material for the bearing of the toe or extreme end, where the destruction was most rapid, and that the best form was that of two hemispheres, working under a constant jet of cold water. The experience upon the 'Rattler' tended to show, that it was advantageous, to reduce the bearings as much as possible; for they had always worn down to certain dimensions and then had ceased to wear. On the contrary, however, on board the 'Great Britain' and the 'Napoléon' it appeared, that an increase of the size of the journals had been advantageous. On this practical question, the manner in which the thrust of the propeller-shafts was received in the toe bearing, must be well considered, before any rule could be laid down.

As had been previously stated, one of the chief merits of the screw was, its permitting such a advantageous use of the sails.

In the 'Rattler' it was found, that when, with steam alone, the vessel was running 9¼ knots to 9½ knots per hour, and the engines were making 26 strokes to 26½ strokes per minute, on the sails being set, the speed increased to 12 knots, and the engines made freely 28½ strokes. At that rate it was supposed the screw was dragged through the wafer; but on applying the dynamometer, it was found that the forward thrust of the shaft was the same as before the sails were used. The screw was, therefore, producing its full effect. If the sails had been set on a paddle-wheel vessel, under similar circumstances, the lee wheel would have been so much depressed, as to have impeded the progress; and the windward wheel would have lost a considerable portion of its effect, owing to the heeling of the vessel. To that cause must be attributed the fact of the Royal yacht gaining speed, in proportion as it shortened sail, with the wind on the beam.

In the recent trial cruize, while rounding the 'Longships,' against a heavy head sea, the 'Rattler' did not make good way. The vessel pitched so, that the propeller was frequently more than half its diameter out of the water. On trying the dynamometric effect, it was ascertained that the power was fully expended, but that it was insufficient for the tonnage of the vessel, whose build also was not calculated for speed. In rough weather, with a heavy wind, the rigging was a serious impediment to speed, but with the wind a little abaft the beam, it was thought, that in spite of her build, the 'Rattler' would prove herself fully equal to any vessel, of similar power and tonnage.

From his previous experience of the performances of the 'Ratler,' in smooth water, Mr. Smith had recommended to the Admiralty, that a larger propeller should be tried. The recent trials at sea, had proved the correctness of the recommendation, which was now being acted upon.

Captain Crispin corroborated Mr. Smith's statement, relative to the Royal yacht. With the wind on the beam, owing to her heeling over, the lee wheel was so much plunged, as to materially reduce the speed of the engines and of the vessel, and the more the sails were reduced, so as to bring her upon an even keel, the faster she overhauled the 'Rattler,' whose engine power he considered insufficient fer the tonnage; whilst the superior size and power of the yacht, enabled her to make good way against a heavy head sea. The performance of the 'Rattler,' with the wind on the beam, and the canvas set, surprised all the officers of the squadron.

Mr. F. P. Smith repeated, that in his opinion the screw was preferable to paddle-wheels, under all circumstances; but it was in a rough sea, in combination with sails, that its merits were most apparent.

In going down the river with the "Archimedes," he had repeatedly been passed by merchant steamers; but by the time he had reached Dungeness, the "Archimedes" had fetched up the loss, and was some distance a-head of the other steamers.

With a propeller of two arms, he had found, that if, instead of disengaging the screw, and letting it run loose, that the arms were fixed vertically with the stern-post, the "Archimedes" would make, under sail, from 9 knots to 9½ knots per hour.

The propeller formerly used on board the "Rattler" was 10 feet in diameter, with two blades one-eighth part of the disc, and that now used was of the same diameter with the blades of two-sixths of a disc.

The speed was ascertained by the common and by Massey's patent log, carefully thrown, and attended to by the officers.

Mr. J. G. C. Curtis remarked, that it was necessary to be extremely cautious in using the results of the ordinary log, for although very useful for the common purposes of navigation, he did not think they ought to be allowed to enter into the computation of a vessel's velocity, where the "slip of the screw" was to be determined.

Mr. Curtis having been employed under Sir Edward Belcher, in his surveys in the Pacific, when the distance run by the vessel had to be determined with the greatest precision, might, perhaps, be permitted to make a few remarks on this subject.

The velocity of a ship being determined with the ordinary log, by ascertaining how much of the line, attached to the log, ran out in a given time, it was essential, that both the time and the distance should be correctly measured; but that was seldom the case, as the sand in the sand-glass, which measured the time, was affected by every change in the atmosphere, and the line which measured the distance was alternately wet and dry, and being stretched unequally, at different parts, it was impossible that the marks, or knots, could remain at the distances which they were intended to indicate. These difficulties, when the vessel was going less than 8 or 9 miles an hour, might be partially surmounted, by counting the requisite number of beats of a good watch, instead of using the sand-glass, and by actually measuring the quantity of line which ran out, instead of counting the distance by the knots.

But in heaving the log at higher rates, it was difficult, to prevent the log from being dragged after the ship, by the friction of the reel, and whether the line was "taken off" or "paid out," there was always a degree of doubt, whether the correct length had been allowed to go off the reel.

It was also nearly impossible to measure the time to the requisite degree of accuracy, by the 14 seconds sand-glass, which was generally used at high rates.

For instance, if a vessel were going 14 knots, the quantity of line representing one mile passed through the hand of the observer in one second of time; and hence, in order to obtain the speed to the eighth part of a mile, it would be necessary to measure the interval to the eighth part of a second. In like manner, to obtain a vessel's speed to the eighth part of a mile, when she was going 10 knots, it would be necessary to measure the interval, to the sixth part of a second.

As these small portions of time could not possibly be measured by a sand-glass, persons unacquainted with the subject would not be surprised to learn, that Mr. Curtis had heard it expressed, as an opinion, by most naval officers, and had found by his own practice, that the rate of a ship, going more than 10 knots, could scarcely be obtained within a mile, under unfavourable circumstances.

As Mr. Curtis was convinced, that the difficulty of accurately measuring the speed, was one of the greatest causes of the discrepancies which existed in the accounts of the trials of vessels, he ventured to suggest an expedient "for determining a vessel's velocity at any given instant," which he thought would be more accurate than the common log. He proposed, that the time which a vessel took, in passing through her own length, should be measured, from which her velocity per hour could be easily ascertained by proportion.

For this purpose he would fit, in convenient places, at a short distance from either end of a vessel, two rods, one vertical and the other horizontal, so that each pair, when seen in coincidence, should point in a line perpendicular to the direction of the vessel's keel. He would also have a buoy painted white and black, or any colours that would show well, when in the water; to this he would attach a line considerably exceeding the length of the vessel.

This buoy should be passed forward, with plenty of spare line to the bowsprit end, the end of the line being made fast abaft, ready to haul it in when done with.

When these preparations were complete, he would stand at the foremost pair of rods, with an assistant at the after pair; he would then direct the buoy to be hove overboard, as far out from the vessel as possible; as it passed his own rods, he would commence counting the beats of a good watch, until his assistant, by holding up his hand, or giving some other signal, indicated that it had passed the after rods, and then the calculation was easy. The number of beats counted, was to the number of beats in an hour, as the distance between the rods, was to the velocity per hour.

In a vessel like the "Great Britain," where the length was $\frac{1}{19}$th of a nautical mile, the method proposed, would possess great advantages over the common log, particularly at high velocities, and in practice, the method would be very easy, as a table might be made of the velocity, corresponding to a given number of beats, and in smooth water, a good-sized chip, or a bottle, might be thrown overboard, and would save the trouble of hauling in the buoy.

Captain Hosken could not agree with Mr. Curtis, as to the general incorrectness of observations by the log. He was convinced, that with a correct glass and a log properly "hove" by an experienced seaman, the distance would be given to ⅛th of a mile. Under all circumstances, he thought the common log was the best known means of ascertaining the speed at sea. "Massey's" log was, perhaps, the best of all the other instruments he had seen and tried. When a vessel was going less than 5 knots, it did not indicate sufficient distance; between 5 knots and 8 knots, it was very correct; but above that speed, it again gave insufficient distance. He had Massey's log overboard, from the "Great Western," all the way from New York to Bristol, when the distance shown, was about 200 miles less than the ship had actually run. The average speed on that occasion, was about 10 knots per hour. He however thought, that Massey's log was an excellent guide for running channel distances in the night, or in thick weather.

Sir John Rennie, *President*, directed attention to a remark made by Sir Charles Napier, as to the relative powers of vessels with screw propellers, and with paddle-wheels, for clawing off a lee-shore.

Mr. F. P. Smith was of opinion, that if a vessel with a screw, used her canvass, as well as the propeller, she would claw off quite as well, if not better, than a paddle-wheel steamer, as from the heeling of the vessel, the lee paddle would thereby lose much of its power.

Captain Hosken thought, that a screw would make less leeway than paddle-wheels, and would be quite as effective in clawing off. The American steamers had their paddle-wheels driven by separate engines, and had of course the advantage of being able to turn a-head on one side and astern on the other. Even that, however, was not very effective, and of course, was not applicable to a sea-going steamer, in which disconnected engines and wheels would be, practically, very dangerous.

Mr. F. Braithwaite said, that Captain Hosken's remarks on American steamers induced him to ask, whether there was any provision on board the "Great Britain," for disconnecting the engines from the screw, and in how short a time it could be done? Some very good methods of disconnecting had been designed and put in practice by Messrs. Maudslay and Field, and by Messrs. Seaward, and he understood, that the system had been advantageously applied on board some French steamers. Two steamers recently on their passage from France to Algiers, with a fair wind, afforded a good example. One of them, being able to disconnect the paddles and use the sails, saved half the fuel, and arrived within a few hours of the other that had steamed the whole distance. He believed, that only about half a minute was occupied in disconnecting.

Mr. Guppy explained, that on board the "Great Britain," the means of disconnecting the screw, was by taking out four screw bolts, and drawing back a coupling-box, which occupied about a quarter of an hour, during which time, the engines must be stopped. He considered it hazardous, with such powerful engines, to have any means of disconnecting, which might be used while the machinery was in motion.

Mr. F. Braithwaite must contend, that under certain circumstances, it was very advantageous to have the power of disconnecting rapidly. The "Phœnix," a vessel built by Messrs. Scott and Sinclair, (Greenock) struck and sprung a serious leak, and when it was found that the hand-pumps could not gain upon the leak, the paddles were disconnected, and all the power of the engines being applied to pumping, she was kept afloat and was saved.

Mr. John Scott Russell corroborated the statement as to the "Phœnix." The coupling alluded to was very efficient and safe.

With respect to the value of the lee-paddle, he thought it of little use, even if the windward paddle could be disconnected. In some experiments on the subject, he found, that a vessel using her power upon both wheels, could be brought round in two minutes, and when using only one wheel, three minutes were occupied in bringing her round; proving that the diminution of speed, by the loss of one wheel, was more than equal to the effect of the disconnected wheel. There where instances of vessels having one wheel disabled, and finishing their voyage with the remaining wheel, without much inconvenience in steering.

An instance was recorded of a steamer, commanded by a good seaman, though but little accustomed to steam navigation, getting his vessel into the trough of the sea in very heavy weather, and being entirely unable to bring her head to windward, until the mate suggested reversing the engines, by which means she was easily brought up, and afterwards made her passage safely.

Captain Hosken stated, in reply to a question from the President, that he thought the 'Great Britain' would not be more liable, than other ships, to "broach to," when scudding. His opinion was founded upon experience in the 'Great Western.' The same question had been put to him by old seaman, before the first voyage of that vessel, when from that ship's great length, it was thought, there would be more than usual difficulty in steering her; Captain Hosken differed from the general opinion, and time had clearly shown that he was right, as she scudded and steered as well as any, and better than most other ships. The 'Great Western' was as great an increase in size, when she was built, as the 'Great Britain' was now; and he felt confident, that ship would prove as triumphant a specimen of naval architecture.

Scudding well, was a point of great importance, and was entirely a seaman's question. No point required more judicious management, and correct judgment, than as to when a ship could not scud longer with safety, and ought to be "hove to."

He had very often, in the 'Great Western,' been scudding past very fine ships of from 500 tons to 1000 tons, not very deep in the water, "laying to," because they could scud with safety.

There were now several steamers longer than the 'Great Western,' and he had never heard that any difficulty had been experienced with them, on this important point.

So far as he had the opportunity of trying, he would say most decidedly, the 'Great Britain' steered easier, and better than the 'Great Western;' and he was sure he could not find a better ship to compare with, either in the naval or mercantile service.

Mr. Pim mentioned an advantageous application of the combined power of the screw and sails, which had been practised by his relations, Messrs. Pim, of Hull. They had adapted to two fine trading schooners, screw propellers, driven by small engine power. The result of this experiment had proved, that in cases where extreme speed was not an object, but in which regularity was essential, this plan might be advantageously adopted, especially for commercial purposes, in which it was requisite to combine economy and a certain amount of dispatch.

The vessels he alluded to were very sea-worthy boats, and on one occasion, when on a voyage to Dublin, the 'Shannon,' a large merchant steamer, had been obliged to run for shelter, one of these vessels had rode out the gale, and made her passage. He believed, that they were propelled by Mr. Smith's screw, and that he could give all the particulars of their construction.

Mr. F. P. Smith said, the vessels alluded to were the 'Margaret' and the 'Senator,' trading from Hull. They were fine four-masted schooners, of 242 tons burthen; each vessel had on board two engines, severally of 14 H. P., placed as close as possible to the screw propeller, which was driven by gearing. The total weight of the engines, screw, and tubular boilers with their water, was 15 tons, and they worked under a pressure of 8 lbs. to 10 lbs. of steam.

In a trial between one of these vessels and the 'Shannon' Steamer, it was found, that between Dublin and London, the 'Shannon' consumed 90 tons of fuel, while the schooner, with 300 tons of cargo on board, only used 18 tons of coal, and arrived in London within 10 hours after the 'Shannon.' In an experiment with the 'Senator,' with 172 tons of cargo on board, when steaming only, the rate through the water by the log was 6½ knots; and with sails and steam, the rate was 9½ knots to 10 knots. It was remarkable that this increase of speed did not appear to augment the consumption of fuel; whereas, with paddle-wheels and sails, the consumption of fuel increased in proportion to the rate of the vessel through the water.

Captain Hosken could not permit the discussion to terminate without stating that in his opinion, as a naval officer, one of the great merits of the screw, as a propeller, was its capability of being adapted to a full-rigged ship, using at times her canvass as usual. The British seamen would thus be fully as much employed as heretofore, and they would retain that superiority, which had so largely contributed to the high position held by Great Britain in the scale of nations.

Mr. J. Field, V. P., said he had received a communication from Lady Bentham, relative to some of the improvements in naval architecture, introduced by the late Sir Samuel Bentham, which appeared to be so interesting, that, with the permission of the President, he would request a portion of it might be read to the meeting.

The communication commenced by stating, that as in the paper on the construction of the 'Great Britain,' particular stress was laid upon the advantage of fixed water-tight bulk-heads, dividing the hold into several compartments, the merit of the first introduction, of that great improvement in naval architecture, must be claimed for Sir S. Bentham, it then proceeded,—

"On reference to his Naval Papers, it appears, that in the year 1795, he was entrusted by the Lords Commissioners of the Admiralty, to construct six vessels of war, according to his own ideas and under his direction, at Redbridge. In the Naval Papers, No. 8. part 8, 'Improvement in vessels of War,' a short communication is given, of the several expedients he introduced into them, with a view to strength, durability, efficiency, and diminution of cost; (page 91) it appears, that he had introduced in those vessels 'fixed bulkheads, or partitions formed in a manner calculated to contribute to strength, both in the transverse and longitudinal directions; that they comprehended in their construction, diagonal braces, at the same time, that they served as partitions for the convenience of habitation, or for the separation of stores;' that they connected the bottom, sides, and decks together, so as to prevent their racking or working at sea; and 'a farther use of these partitions was, that having been made water-tight, as practised by the Chinese of the present day, as well as by the ancients, they tended to secure the ship against foundering, by confining the water from a leak, to the space between two partitions.' "

"Again, (page 99) amongst the various expedients enumerated, as tending to diminish the danger of material injury, or the loss of a ship in case of her striking the ground, it is stated, that "the interior of the vessel having, as above-mentioned, been divided into several water-tight compartments, it is not even the flowing of water freely, into one or two of these compartments, that would endanger the loss of the ship."

"So also in 'The Elements and Practise of Naval Architec-

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ture,' (page 177, third edition,) in giving an account of the above-mentioned vessels, of Sir Samuel Bentham's construction, the author says, 'the mode of structure of these vessels is very different from that of others,' and after mentioning various particulars, says, 'but the principal strength seems to depend on the thwartship braces and bulkheads, which connect the sides together, more conformable to the practice of civil architecture.

"Besides these fixed bulkheads, the metallic water-tanks (invented by Sir Samuel Bentham, for the preservation of water), were on board these vessels, 'so contrived that their fore and aft partitions, extending in height, from the bottom of the ship to the deck, operated as supports to both bottom and deck.'—Naval Papers, No. 8, page 108. So also 'the metallic canisters, for keeping powder, were adapted to the shape of the vessel.'"

"It may be added, that other of the improvements introduced, I understand, in the 'Great Britain,' had, as well as the water-tight compartments, been half a century ago exemplified in Sir S. Bentham's vessels, such as the tumbling-out of the topsides and the straight decks."

"The above-mentioned work, 'Elements and Practise of Naval Architecture,' and Sir S. Bentham's 'Naval Papers,' Nos. 2, 7, and 8, record the extraordinary strength and efficacy of his vessels, as well as a variety of peculiarities in their construction, whereby that strength was given, with about half the quantity of timber used in the customary mode of construction, and only one-sixth part of the copper was used for fastenings."

"This statement cannot, in any way, detract from Mr. Guppy's merit in the construction of the 'Great Britain.' Real genius disdains to appropriate, without acknowledgment, the improvements of others; thus Sir S. Bentham referred as above to the Chinese and to the Ancients. Whether Mr. Guppy may have re-invented the expedients in question, or have perceived the advantage of them, as proved by the actual service of the vessels in which they were exemplified, and have adopted them, to him must be ascribed the benefit which ship-building cannot fail to derive, from his introduction, to general use, of Sir S. Bentham's improvements in naval architecture."*

Sir J. Rennie, *President*, after expressing to Mr. Guppy the thanks of the meeting, for the communication which had given rise to so interesting a discussion, said the construction of iron sea-going vessels was a subject of peculiar interest to the Institution, as to one of its early members must be ascribed the merit of their first introduction.

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* Since the receipt of this communication, the Secretary has received from Lady Bentham a paper, from which the following extract is made:—"It is now half a century since Sir Samuel Bentham, in conversation with the First Lord and other Lords of the Admiralty, satisfied them, that the general principles of mechanics were as applicable to naval as to civil architecture, although they never, up to that time, had been scientifically applied to the construction of ships. The consequence was, that the Admiralty induced him to undertake the construction of six vessels of war and a water vessel, in every respect conformably to his own uncontrolled ideas, and un-

The first iron steam vessel that ever went to sea was built in 1820-1 at the Horseley iron works, near Birmingham. It was

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der his sole direction. These vessels were, the sloops, the 'Arrow,' and the 'Dart,' and the schooners, the 'Netley,' 'Millbrook,' 'Redbridge,' and 'Cling,' all vessels of war.

"These vessels differed, in exterior form, from the general build of vessels of war, having been larger and sharper; they projected or raked forward, above the water-line, like a wherry; the top sides, instead of retiring inwards, were continued flaring outwards to the upper edge. By this difference in form, the vessels were better supported than the usual ones, when pitching or rolling in a sea, and it was found that they both pitched and rolled easily. In actual service they proved excellent sea boats, sometimes keeping their station on an enemy's coast, when other ships of war were forced to run for safety; sometimes making their port when all other vessels, on the same station, were driven down channel; sometimes out-sailing vessels in company at sea. The 'Netley' was the only vessel, on the station, that could be sent in-shore off Havre, in the night, because she was the only one that could be depended on for working off a lee-shore in any weather, 'when they dared not trust the frigates.' To use the words of the 'Elements and Practice of Naval Architecture,' 'they have, generally speaking, been found to sail remarkably well; but in a head sea and tempestuous weather, their superiority as sea boats has been most decided.

"For giving strength to these vessels, several new expedients were introduced, such as—

"*In the construction of the vessel:*

1. Diagonal trusses, or braces of oak, to prevent racking.
2. Fixed bulkheads, longitudinal and transverse, for fixing the bottoms, sides, and decks together.
3. Thick, strong pieces, under the ends of the beams, in lieu of knees.
4. Increased thickness of the outer planking, and of the deck.
5. Straight decks fore and aft.
6. Placing the timbers at right angles to the rising line of the dead wood, instead of being all the way perpendicular to the keel.
7. Passing the beams between the timbers, so as to afford means of connecting the beams immediately to them.
8. Choice of timbers; namely, that of small scantling but well seasoned, by having lain long in the sap.
9. Avoiding the use of grain-cut timber.

"*In respect to fastenings:*

10. Trenails of a shape of his invention, in steps, that is, of different diameters, in different parts of their length, the greatest at their head, the least at their point, with conical heads engine-turned. These trenails held faster than the usual ones, yet the timbers in which they were inserted were less wounded than by the ordinary trenails.
11. The use of augers for making holes of corresponding exactness with the trenails, so that the holes might be perfectly filled up, to the exclusion of water and moisture.
    These trenails, so inserted, kept the planking of the bottom in perfect contact with the timbers, notwithstanding the most severe caulking.
12. Short metal screws, hollow in the thickest part, the heads of a shape for holding firmly, and more particularly for fastening the butt-ends of the plank.
13. Bolt nails of a mixed metal, of a shape and of a hardness that ad-

named the "Aaron Manby," after the constructor, and being put together in the Surrey Canal Dock, took in a cargo of rape-seed and iron castings, in the Thames, and landed it at the Pont Royal at Paris without transhipment. This unique voyage was performed under the command of Captain Sir Charles Napier, R.N., who was largely interested in the undertaking, and devoted much

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mitted of their being driven into oak or fir, without splitting the wood.

14. Instead of bolts, only clenched-on rings. A new description of bolt, with screws on the ends, nuts to screw upon them, and plates, both for screwing the nuts against, and for receiving the heads of the bolts. Thus the bolts were not only drawn more firmly at first, but they admitted of being screwed up more tightly, in case of shrinkage of the wood.
15. Nails of a new form for sheathing, having flat or smooth heads, and tapered only in one direction; of pure copper, instead of mixed metal; thereby not liable to contaminate the sheathing on remelting.

"*Expedients against loss, by injury to the bottom, and against foundering:*

16. Extra thickness of plank for the lower part of the vessel, as above mentioned; it having been 6 inches instead of only 3 inches, as usually employed.
17. Terminating the plank against the dead wood, so that the dead wood, the lower part of the stern-post, or even the keel itself, might have been beaten off, without letting water into the vessel.
18. Giving such a form to the rudder, that although the bottom part might have been beaten off, still enough would have remained to steer the ship by.
19. In the 'Arrow' and the 'Dart,' hawse-holes in the stern, the same as in the bows, to enable them to be brought to anchor in a narrow channel, riding stern foremost.
20. A pre-eminent improvement against foundering, was the water-tight compartments, first introduced in these vessels. That is, the longitudinal and transverse bulkheads, so efficient, as above mentioned, in point of strength, by being water-tight, divided the vessel into several water-tight compartments, so that, although water should have entered into two or three of these compartments, the vessel would not sink.

"*Against accidents from explosion:*

21. Instead of casks, metallic canisters for keeping powder. These canisters were air and water-tight, and were so arranged, as that in case of alarm of fire, water might easily have been let in over and around them, without injury to the powder, and so that after the danger were over, they could speedily be laid dry again.
22. Safety lamps in lieu of a magazine light room. These lamps were encompassed by a double casing of glass, filled in between with water; the whole so contrived, that in case of breakage of the glass, the water would extinguish the light.

"*Expedients with a view to efficiency in point of stowage room, and to the health and comfort of the crew.*

23. Instead of store-rooms, against the sides of the ship, fixed bins, not higher than tables, were introduced, leaving a clear space around them, as well as above them, so that besides easier access to the stores, the sides of the vessel were left clear to get at them, to stop shot holes.
24. The powder canisters were adapted to the shape of the vessel; consequently a much greater quantity of powder would be stowed in a given space, than where the powder was in casks.

time and his usual skill and energy to the enterprise. The engine was put together, and was worked during the voyage, by the present Secretary of the Institution. The propellers were the feathering paddles which were invented by the late Mr. John Oldham. Both the engine and the paddles had been superseded by more perfect machinery, and the boilers had been frequently

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25. The invention of metallic tanks for holding water, instead of casks, with a view to the preservation of water sweet at sea.
26. The adapting those tanks to the stowage of a much larger store of water than usual. This was effected by forming them to the shape of the vessel, so that no space was lost between them and the sides, nor between one and the other of them, as necessarily must be in the case of casks. The framing of these tanks also contributed to the general strength of the vessel, by its extending from the bottom to the deck, and so connected to them, as to form a part of the general fabric.
27. Thick pieces of glass as illuminators, either flat or convex, were introduced in various parts of the vessel, usually dark, but where light was very desirable.
28. Greater distance than customary between deck and deck, so as to give height for the men to stand upright.

"The expedients introduced in these vessels with a view to economy in their structure, were—

"*In regard to timber:*

29. The use of small timber, of which there was abundance in the market, instead of large timber, of which there was an increasing scarcity, the smaller timber being from 25 to 50 per cent. cheaper than the large.
30. The use of timber of kinds less costly than oak, but using those cheaper kinds only in parts for which they were appropriate, as elm and beech for parts always under water, fir for parts where strength was required, in resistance to tension, in the direction of the fibre.
31. No knees.
32. No crutches nor breasthooks.
33. No earlings nor ledges.
34. Little or no footwalings, circles, or inside planking.

"*In regard to metal:*

35. Short metal screws.
36. Screw-pointed bolts, whereby half the usual number of bolts was saved.
37. Sheathing nails of pure copper.
38. Bolt nails of mixed metal, instead of copper.

"The efficiency of these expedients for their intended purposes, was proved in the long and active service of these several vessels.

"In point of strength, they were exposed to a variety of severe trials without injury. Amongst others, the 'Milbrook,' after launching, was left dry at low water near Southampton by some accident, across and hanging on a log of wood; her sheer was not broken, nor did she sustain any other injury. The 'Dart,' in the year 1799, with her guns and stores on board, ready for action, on going up the Texel, with much smaller vessels, and where no other of her force and size dared venture, frequently got aground, and dragged and beat against the shoal, without being in the least injured. The 'Redbridge,, of no more than 160 tons, yet carrying fourteen carronades, sixteen pounders, had one of them, by accident, loaded with three shot, together with the full charge of powder, and which was fired off without the least injury to the vessel. On board the 'Dart,' one of her thirty-two pounder carronades, was fired no less than eighty rounds suceessively, and with an expedition far exceeding what is possible with ordnance mounted in the usual manner, yet the vessel was not in the least affectcd by it. On the same occasion, the renewed, but the hull of the vessel had required but little repair, and was still at work upon the Seine, as were several other iron vessels built by Mr. Manby, about the same time, at Horseley, and at his works at Charenton, near Paris.

The introduction of iron, as a material for ship-building, was now becoming so general, that the result of the great experiment,

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'Cling' fired four hundred ronnd shot from her aftermost carronade, without doing the slightest injury on board. In many letters it was stated, that after storms and the roughest weather, not so much as the paint or whitewash on the seams of the six several vessels had been disturbed. On an official survey of the 'Dart,' and this after she had been in service seven years, it is stated, in the official reports of that survey, and amongst many other proofs of strength, 'I do not find one decayed timber in her, a circumstance exceedingly uncommon in ships of such an age. I do not perceive an evidence of even the pitch of the butts on the gangway having cracked. On the most minute survey, more than once or twice, I discovered not the least sign of working. The caulking at the wooden ends was perfectly sound and good. The oakum in the seams was perfectly dry and solid; even the indents remain in it, caused by the sawn edges of the plank, &c. &c.'

"It seems proper to add, that the 'Dart' had been in many actions, previous to that survey.

"In respect to the expedients against foundering, besides the examples these vessels afforded, of their security after beating on the ground, it must be noticed, that since of late water-tight compartments have been adopted, striking instances have occurred of the preservation of life by this expedient.

"*As to stowage room and health and comfort of the crew.*

"The space gained by the above-mentioned and other minor arrangements, may be best judged of by a comparison of that between decks in an eight-and-twenty gun frigate, and the 'Dart.' In a frigate of 28 guns, taken for comparison, there were but 10,278 cubic feet between decks; whilst between decks of the 'Dart,' there were 19,306 feet; or in the frigate, 52 feet to a man, in the 'Dart' sloop, 137 feet to a man.

"The 'Dart' and 'Arrow' were of about 500 tons; but though carrying the number of guns of a 28-gun frigate, they had a sloop's complement of men.

"A much greater quantity of powder and of various other stores were stowed in a given space. The quantity of water was nearly double; and, what is of great importance in regard to this necessary store, by the invention of metallic tanks, water can be preserved sweet at sea. A quantity of water, that had been no less than three years in one of the tanks, on board the 'Dart,' having been sent, in the year 1800, duly verified in every respect, to the Society of Arts, their honorary gold medal was awarded to Sir Samuel Bentham for this invention.—(*Vide* Trans. Soc. Arts., vol. xix. 1801.,—pp. 191 and 374.)

"Metallic tanks have since been very generally adopted, with the difference in favour of those now used, that they are of the cheapest metal—iron; but on the contrary, they have usually the disadvantage of not being shaped to the form of the vessel, and of not contributing, in any way, to the strength of its structure.

"*Saving of first cost:*—

"It appeared from the Report of the master shipwright of Deptford Dockyard, on comparing the quantity of timber employed for the 'Dart,' with that consumed for a frigate of the same size, the 'Maidstone,' and taking into account, in both cases, the loss on conversion, that not a seventh part of that used for the 'Maidstone,' had been necessary for the construction of the 'Dart.'

the "Great Britain," must necessarily be regarded with much interest, and next session, the Institution would look forward to receiving from Mr. Guppy an account of the first few voyages, and, if skill and experience could accomplish them, they might be considered safe in the hands of Captain Hosken, whose success in the "Great Western" had been so decided.

"The absolute saving in copper, together with that of timber, was so great, that a contractor dealing with the Navy Board, and conversant with the structure of these vessels, made a direct offer to that Board, to build a frigate, according to this new mode of structure, for little more than half the price paid for vessels of the same magnitude, according to the usual mode.

"In addition to the improvements exemplified in the above-mentioned vessels, may be specified, Sir Samuel Bentham's invention of 'Coqueing.'

"This mode of connection, he described, as applicable to framed work in general, in all cases, where the force to be resisted tends principally to make the pieces slide one over the other. It was particularly noticed and approved of, by the Lords of the Admiralty, on their visitation of the Dock Yards in the year 1802.

"The most important advantage of this invention, is the very great additional strength given to vessels, of which the parts are so combined. Besides this, savings are effected by it in various ways; by the saving of timber, for instance, where coqueing is employed, instead of tabling, as in making masts, in which case the saving of workmen's wages alone, amounted to 25 per cent., that having been the reduction made, on the price paid them for putting masts together when this mode was introduced.

"This invention was soon very generally adopted by private ship builders, and has been used in some cases of civil architecture and engineering, to which arts it is equally applicable. The ordnance department also very soon adopted it."

LIST OF REGISTRATIONS EFFECTED UNDER THE ACT FOR PROTECTING NEW AND ORIGINAL DESIGNS FOR ARTICLES OF UTILITY.

1845-46.

Dec. 30. *Samuel Messenger*, of Birmingham, for an improved railway lamp.

31. *William Goddard*, of Nottingham, for a knitted shirt or vest.

Jan. 1. *Berens, Blumberg, & Co.*, of 33, St. Paul's Churchyard, London, for an instrument for holding up ladies' dresses.

2. *Ebenezer Taylor & Son*, of 25, Bartlett's-buildings, Holborn, London, for a watch protector.

2. *Maria Connor*, of 6, Cambridge-terrace, Dacre Park, Blackheath, for a knife and fork cleaner.

2. *John Baldwin Wheeler*, of 23, Poultry, and *John Lee Ablett*, of 234, Regent-street, London, for a stiffener.

Jan. 5. *George Prudden*, of Hitchin, Hertfordshire, for a hot-water stove.

5. *George Blackmur*, of York-street, Commercial-road, for the Princess Royal parasol and umbrella tube.

6. *John Scholl*, of 41, Berwick-street, Oxford-street, for a bow-drill.

6. *Joseph P. Oates*, of Sutton Coldfield, near Birmingham, for an equilateral valve and improved turning slide for the tromba cornuta cornopœan and other valve instruments.

8. *E. L. Simmons*, of 26, Coleman-street, London, for a portable hygrometer.

9. *George Mander*, of 25, Old Compton-street, Soho, London, for a folding level staff.

10. *Ann Lawson Ollivier*, of 54, Pall Mall, for the "cordon retrousseur."

12. *Hugh Strath*, of Brownlow Mews, Gray's-inn-road, for a chimney cowl or guard.

14. *William Goddard*, of Nottingham, for a knitted shirt or vest.

15. *Henry Powell*, of 102, New Bond-street, Middlesex, for the "comprimo brace."

17. *Thomas Watkins & Son*, of 1 and 2, Cannon-street, London, for a quill-pen protecting cover.

20. *Abraham Thomson*, of Willenhall, Staffordshire, for a padlock.

21. *George Smith*, of Conduit-street, for the Victoria toilet.

23. *Edward Walmsley*, of 138, Union-street, Southwark, London, for a ventilating hat.

23. *George Farrow*, of Park Lodge, Peckham, Surrey, for a knife and fork cleaner.

26. *William & George Ashford*, of Birmingham, for a bit.

26. *Edward Cahan*, of 371, Strand, for the "omnium."

27. *Captain Thomas St. Vincent Troubridge*, of H. M. 7th Royal Fusilier Guards, of 11, Eaton-place, Belgrave-square, for a design for carrying knapsacks and valises.

27. *James Hayes*, of Elton, Huntingdonshire, for a straw-shaking machine, applicable to thrashing machines.

List of Patents

Granted for SCOTLAND, subsequent to December 22nd, 1845.

To John Field, jun., of West Brixton, Surrey, for improvements for ascertaining the alcoholic strength of liquids,—being a foreign communication.—Sealed 26th December.

Henry Watson, of Newcastle-upon-Tyne, brass-founder, for improvements in withdrawing air and vapours from furnaces or other apparatus, and in condensing and employing such vapours.—Sealed 26th December.

Alfred Vincent Newton, of the Office for Patents, 66, Chancery-lane, London, mechanical draughtsman, for improvements in printing and dyeing various fabrics,—being a foreign communication.—Sealed 6th January.

James Augustus Dorr, of New York, United States of America, for certain improvements in machinery or apparatus for knitting,—being a foreign communication.—Sealed 6th January.

William Smith Brown, the younger, of Broad-street, Ratcliff-cross, London, sail-maker, for improvements in the manufacture of square and quadrilateral sails for ships and other vessels.—Sealed 7th January.

Joseph Douglas, of Cross Cheaping, Coventry, furnishing ironmonger, for improvements in the patterns used for casting, and in casting metals.—Sealed 7th January.

James Garforth, of Duckenfield, Cheshire, engineer, for certain improvements in machinery or apparatus for connecting metallic plates for the construction of boilers and other purposes.—Sealed 7th January.

Alfred Vincent Newton, of the Office for Patents, 66, Chancery-lane, London, mechanical draughtsman, for improvements in combing wool,—being a foreign communication.—Sealed 9th January.

Conrad Haverkam Greenhow, of North Shields, for improvements in the construction of railways and railway carriages.—Sealed 19th January.

Charles Henry Joseph Forret, of Lille, in France, but now at No. 17, Great St. Helen's, Bishopsgate, for a new and improved Archimedian screw, which he calls "Davaine's screw," —being a foreign communication.—Sealed 21st January.

Charles Dowse, of Camden-town, London, for an improved paper or material.—Sealed 22nd January.

Robert Rettie, of Glasgow, civil engineer, for an improved method of signalizing or telegraphing on sea or land, preventing collision, and giving signals of distress by improved burners and glasses, colored or otherwise; applicable to railways in all the various departments, as well as preventing of accidents when the train is at full speed; shewing the state of the tide in harbours at night or day; also the diurnal for railways, towns, and villages.—Sealed 22nd January.

John Paltrineri, of No. 1, Skinner's-place, Size-lane, for certain new and improved modes of obtaining and applying motive power.—Sealed 22nd January.

George Howell, of Larkhall-lane, Clapham, Surrey, for an invention for coating with a metal the surface of articles formed of copper or copper alloys, or iron, wrought or cast,—being a foreign communication.—Sealed 22nd January.

New Patents
SEALED IN ENGLAND.
1845-6.

To John Russel, of the city of Edinburgh, accountant, for a manufacture of glass tiles. Sealed 30th December—6 months for inrolment.

Thomas Swinburne, of Lincoln's Inn, Esq., for improvements in railways, and in the means of propelling and carrying thereon. Sealed 3rd January, 1846—6 months for inrolment.

Arthur Eldred Walker, of Bouverie-street, London, engraver, for certain improvements in machinery for sewing. Sealed 6th January—6 months for inrolment.

Conrad Haverkam Greenhow, of North Shields, Gent., for improvements in the construction of railways and railway carriages. Sealed 6th January—6 months for inrolment.

Henry Watson, of Newcastle-upon-Tyne, brass founder, for improvements in withdrawing air and vapours from furnaces or other apparatus, and in condensing and employing such vapours. Sealed 6th January—6 months for inrolment.

Joseph Romuald Bozek, of Cheapside, mechanic, for improvements in the construction and application of railroad carriage wheels. Sealed 6th January—6 months for inrolment.

William Smith Brown, the younger, of Broad-street, Ratcliff-cross, sail maker, for improvements in the manufacture of square and quadrilateral sails for ships and other vessels. Sealed 6th January—6 months for inrolment.

Joseph Douglas, of Cross Cheaping, Coventry, furnishing ironmonger, for improvements in the patterns used for casting, and in casting metals. Sealed 9th January—6 months for inrolment.

Charles Chinnock, of Cook's Grounds, Chelsea, for improvements in the construction and methods of extending and compressing articles of furniture and domestic use, also applicable to cutlery, workmen's tools, windows, blinds, shutters, and similar useful purposes. Sealed 12th January—6 months for inrolment.

Charles Hancock, of Grosvenor-place, Gent., for certain improvements in the manufacture of gutta-percha, and its application, alone, and in combination, with other substances. Sealed 12th January—6 months for inrolment.

Henry Schloss, of Finsbury-square, Gent., for an improved instrument or instruments for producing ignition. Sealed 12th January—6 months for inrolment.

John Seaward, of the Canal Iron Works, engineer, for improvements in the steam-engine, and in machinery, for propelling. Sealed 12th January—6 months for inrolment.

George Tillett, of Snow-hill, ironmonger, for improvements in stoves and fire-places. Sealed 13th January—6 months for inrolment.

Jean Marie Dumerin, of Paris, doctor of medicine, for improvements in treating fatty matters. Sealed 13th January—6 months for inrolment.

Thomas Moorcroft Benbow, of Birmingham, surgeon, for improvements in fastenings for surgical and other bandages, and for articles of dress. Sealed 13th January—6 months for inrolment.

Robert Bewick Longridge, of the Bedlington Iron Works, near Morpeth, Northumberland, for an improved locomotive engine. Sealed 13th January—6 months for inrolment.

Joseph Maudslay, of the firm of Maudslay and Field, of Lambeth, engineers for improvements in propelling, and propelling machinery. Sealed 13th January—6 months for inrolment.

Edmund Leahy, of Cork, Ireland, civil engineer, for certain improvements in locomotive carriages intended to be employed on ordinary roads. Sealed 15th January—6 months for inrolment.

William Benson, of Allerwash House, Haydon Bridge, Northumberland, Gent., for certain improvements in machines for the manufacture of tiles and other plastic substances. Sealed 15th January—6 months for inrolment.

William Clarke, of Nottingham, and William Vickers, the younger, of the same place, lace manufacturers, for improvements in manufacturing lace and other fabrics by lace machinery. Sealed 17th January—6 months for inrolment.

Arthur Wellington Price ,of Manchester-street, Gray's-inn-road, Gent., for improvements in the construction of anchors. Sealed 17th January—6 months for inrolment.

Peter Taylor, of Hollingwood, near Manchester, machinist, for certain improvements in machinery for propelling vessels, carriages, and machinery; parts of which improvements are applicable to drawing and propelling fluids; also improvements in the construction of vessels. Sealed 20th January—6 months for inrolment.

Gerard Andrew Arney, of Mare-street, Hackney, Gent., for improvements in the preparation of gelatine and improvements in fining or clarifying liquids. Sealed 20th January—6 months for inrolment.

John Braithwaite, of Bedford-square, civil engineer, for certain improvements in heating, lighting, and ventilating. Sealed 20th January—6 months for inrolment.

William Vincent Wennington, of Goscote Iron Works, Staffordshire, Esq., for certain improvements in, or improved methods of, cutting plate and sheet-iron. Sealed 20th January—6 months for inrolment.

Richard Archibald Brooman, of Fleet-street, London, Gent., for certain improvements in railway and common road carriages,—being a communication. Sealed 20th January—6 months for inrolment.

William Malins, of Mansion-House-place, London, and West Bromwich, Staffordshire, iron-master, for certain improvements in the construction of buildings,—being a communication. Sealed 20th January—6 months for inrolment.

William Newton, of the Office for Patents, 66, Chancery-lane, Middlesex, civil engineer, for certain improvements in manufacturing piled fabrics,—being a communication. Sealed 20th January—6 months for inrolment.

John Nott, of the city of Cork, Gent., for certain improvements in the means of communicating intelligence from one place to another. Sealed 20th January—6 months for inrolment.

Andrew Kurtz, of St. Helens, Lancashire, manufacturing chemist, for certain improvements in the construction of furnaces and apparatus connected therewith, for evaporating or concentrating sulphuric acid. Sealed 20th January—6 months for inrolment.

John Spenceley, of Whitstable, in the county of Kent, master block-maker, for improvements in the construction of ships and other vessels; and also improvements in apparatus to be attached to ships and other vessels. Sealed 20th January—6 months for inrolment.

John Walker, of Manchester, silk manufacturer, for certain improvements in weaving or manufacturing piled or napped cloths or fabrics; and also improvements in machinery or apparatus for cutting the pile or nap of the same. Sealed 20th January—6 months for inrolment.

William Henry Burke, of Tottenham, Gent., for certain improvements in the manufacture of frabrics, which may, if required, be made air and waterproof; a part of the materials employed herein, when combined with other matters, being intended to produce coverings for vessels of capacity. Sealed 20th January—6 months for inrolment.

Charles Wheeler, of Speenhamland, Berkshire, machinist, for certain improvements in the construction and working of railways. Sealed 22nd January—6 months for inrolment.

Joseph Cooper, of Great Chart-street, Hoxton, chemist, for an improved mode of separating certain of the fluid and soluble parts of certain vegetable substances from the solid parts thereof. Sealed 22nd January—6 months for inrolment.

Frederick William Campin, of Fleet-street, in the city of London, Gent., for certain improvements in obtaining and applying motive power,—being a communication. Sealed 22nd January—6 months for inrolment.

Daniel Ross, of South-street, Southwark, hat manufacturer, for improvements in the manufacture of hats. Sealed 27th January—6 months for inrolment.

CELESTIAL PHENOMENA FOR FEBRUARY, 1846.

D.	H.	M.	
1			Clock before the sun, 13m. 54s.
	—		☽ rises 9h. 41m. M.
	—		☽ passes mer. 4h. 42m. A.
	—		☽ sets 11h. 55m. A.
			Occul. Mars, im. 10h. 3m. em. 10h. 23m.
	9	10	♂ in conj. with the ☽ diff. of dec. 0. 48. S.
	22	10	♃ in conj. with the ☽ diff. of dec. 1. 51. S.
3	5	11	☽ in □ or first quarter
4			Occul. ε Tauri, im. 13h. 7m. em. 13h. 53m.
4	10	2	♀ greatest hel. lat. N.
5			Clock before the sun 14m. 19s.
	—		☽ rises 11h. 59m. M.
	—		☽ passes mer. 7h. 59m. A.
	—		☽ sets 3h. 9m. M.
	20	29	☿ in Aphelion
6	9	38	♃'s first sat. will em.
7	4	4	♀ stationary
	5	58	♃'s second sat. will im.
	8	24	♃'s second sat. will em.
	9	10	♃'s third sat. will em.
8	21		☽ in Apogee
9	23	30	♄ in conj. with the ☉
9			Occul. α2 Cancri, im. 18h. 14m. em. 18h. 43m.
10			Clock before the sun, 14m. 32s.
	—		☽ rises 4h. 40m. A.
	—		☽ passes mer. 11h. 52m. A.
	—		☽ sets 6h. 28m. M.
8			♀ in Perihelion
11	9	12	Ecliptic oppo. or ○ full moon.
14	11		♃'s second sat. will em.
15	6	3	♃'s first sat. will em.
15	17		♂ in conj. with ♃ diff. of dec. 1. 50. N.
	—		Clock before the sun, 14m. 25s.
	—		☽ rises 10h. 8m. A.
	—		☽ passes mer. 2h. 45m. M.
	—		☽ sets 8h. 20m. M.
18			Mercury R. A. 21h. 21m. dec. 17. 35. S.
	—		Venus R. A. 23h. 6m. dec. 2. 59. N.
	—		Mars R. A. 2h. 18m. dec. 14. 39. N.
	—		Vesta R. A. 4h. 13m. dec 18. 57. N.
	—		Juno R. A. 15h. 14m. dec. 8. 13. S.
	—		Pallas R. A. 22h. 7m. dec. 1. 32. S.
	—		Ceres R. A. 23h. 51m. dec. 9. 44. S.
	—		Jupiter R. A. 2h. 14m. dec. 12. 26. N.
	—		Saturn R. A. 21h. 40m. dec. 15. 6. S.
	—		Georg. R. A. 0h. 30m. dec. 2. 34. N.
	—		Mercury passes mer. 23h. 32m.
	—		Venus passes mer. 1h. 13m.
	—		Mars passes mer. 4h. 26m.
	—		Jupiter passes mer. 4h. 21m.
	—		Saturn passes mer. 23h. 44m.
	—		Georg. passes mer. 2. 37.
18			Occul. B1 Scorpii, im. 17h. 14m. em. 18h. 27s.
19	4	44	☽ in □ or last quarter
20			Clock before the sun, 14m. 7s.
	—		☽ rises 1h. 33m. M.
	—		☽ passes mer. 6h. 2m. M.
	—		☽ sets 10h. 27m. M.
			Occul. A. S. C. 2069, im. 16h. 20m. em. 17h. 9m.
	23	58	☿ in conj. with ♄ diff. of dec. 1. 4. S.
22	7	58	♃'s first sat. will em.
23	18		Pallas in conj. with the ☉
24	2		☽ in Perigee
24	13	4	♄ in conj. with ☽ diff. of dec. 6. 20. S.
	17	13	Vesta in □ with the ☉
	23	34	☿ in conj. with the ☽ diff. of dec. 7. 14. S.
25			Clock before the ☉ 13m. 20s.
	—		☽ rises 6h. 18m. M.
	—		☽ passes mer. 11h. 50m. M.
	—		☽ sets 5h. 32m. A.
25	7	32	Ecliptic conj. or ● new moon
25	17	20	♀ in conj. with the ☽ diff. of dec. 4. 15. N.
26	6	58	☿ greatest hel. lat. S.
	11	9	☿ in conj. with Pallas, diff. of dec. 11h. 41m. S.
27	13	25	♅ in conj. with the ☽ diff. of dec. 3. 25. S.

J. LEWTHWAITE, Rotherhithe.

THE

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RECENT PATENTS.

To Lemuel Goddard, *of Crescent, America-square, in the city of London, merchant, for an invention of improvements in the manufacture of candles, and in the means of preventing them from guttering whilst burning,—being a communication.*—[Sealed 3rd July, 1845.]

These improvements consist, firstly, in peculiar modes of constructing the moulds in which candles are to be cast; secondly, in novel forms or shapes for the shafts of candles, which may be hollow for the introduction of dry wicks, or cast solid without wicks, or with wicks in the ordinary way; thirdly, in crystallizing the material of which the candles are made; fourthly, in a novel method of covering or coating the surfaces of candles, if required, with a material for ornamental purposes; and fifthly, in peculiar constructions of metallic caps to be applied to candles, in order to prevent their guttering whilst burning, or to conduct a descending wick.

In reference to the construction of moulds for the casting of candles, the inventor makes these moulds of thin malleable metal, by first bending a suitable strip of the metal into a tubular shape, then soldering the edges together, so as to produce the perfect tube, and afterwards drawing the same to the required figure by the ordinary drawing process, upon a polished steel mandril. For the purpose of more readily discharging the cast candles from the moulds, the mandril may be made slightly tapering. These moulds may be made of a round, elliptical, or any other desired form, the main feature being to construct them of very thin malleable metal, drawn upon a mandril, for the purpose of operating upon the candle in the mould in the way hereafter described. In the construction of these moulds, zinc plates, tinned on their surfaces, and of about from the thirtieth to the fiftieth part of an inch in thickness, before drawing, have been found to answer the purpose. These moulds may be arranged in boxes, and made with tips or nibs in the ordinary way; or they may be made with sliding tips or nibs, which will be necessary for discharging such candles as are made without wicks, from the moulds as above mentioned.

In Plate V., fig. 1, represents, in longitudinal section, one of the improved moulds. *a, a,* is the tube or shaft of the mould; *b,* the box or trough, into which the melted material is poured for casting the candle. The lower part of the tube is compressed at *c, c,* to form a ledge or resting place for the sliding tip or nib *d*; which tip has a button at the outer end, by which it may be forced up, in order to relieve the candle previously to its being discharged from the mould, and to replace the nib again in its proper situation. This nib *d,* slides through an aperture in the end of the mould, which aperture forms a guide. The mould here represented is designed for casting hollow candles, through which a dry wick is to be drawn after the candle is made; and for this purpose a long rod *e,* is inserted, its lower end resting in the centre of the nib, and the upper end being held by an adjustable guide *f.* By another form of nib, the end of which may be flat, or of any other required shape, solid shafts for candles, without wicks, may be cast in these moulds.

The novel forms or shapes for the shafts of candles the inventor proposes to be, in some cases, elliptical, with flat wicks inserted, and manufactured in the ordinary way. In other cases, he proposes to make these elliptical shafts, and also cylindrical, as well as other shaped candles, with an aperture through the centre (for the reception of a dry wick, to be afterwards inserted); which aperture is formed by means of the central rod *e*, before mentioned. The patentee also makes elliptical and other shaped shafts for candles, solid, and without wicks or apertures for wicks: these candles are to be burnt by wicks mounted in apparatus hereafter described.

The mode of crystallizing the material, such as spermaceti and any other oleaginous compound, capable of crystallization, of which candles may be made, consists in employing, in preference, the thin metallic moulds, such as have been above described, and immersing the moulds in hot water, immediately on their being filled with the melted oleaginous material; the moulds must be left immersed in the hot water, and allowed to cool as the temperature of the water becomes naturally reduced. By this means, the material will be allowed to coagulate gradually, at an equal temperature throughout its mass, and to form itself into natural crystals; which will produce upon the surfaces of the candles so operated upon beautifully variegated appearances; and by the introduction of coloring matters, in small quantities, in the way well known, into the material whilst melting, the variegated and beautiful appearance of the candle will be greatly improved.

The novel method of covering or coating the surfaces of candles with a material for ornamental purposes, is effected by the use of the above-described thin metallic moulds. The moulds being filled with the melted material, of which the coating of the candle is to be formed, are, immediately on being filled, to be immersed in cold water, for the space of one or two minutes, in order that a thin stratum of the material may become chilled and incrusted on the internal surface of the mould. The thickness of this incrustation upon the interior of the mould will of course depend upon the length of time that the mould is immersed, and will be regulated according to the judgment of the workman. When the incrustation has been thus formed, the fluid part of the material must be poured out of the mould, and the mould then filled with such oleaginous matter to form the substance of the candle as may be desired; the moulds must then be immediately immersed in cold water again, in order to prevent the incrustation from melting and running down into the other material; and having remained immersed in this cooling liquid for two or three minutes, according to the temperature of the water, the moulds are to be withdrawn, and placed in a cooling medium, surrounded by an atmosphere not lower than 70° Fahr. This mode of treating the candles will prevent their cracking, and produce (particularly in spermaceti candles) a smooth face, without the aid of wax. It is scarcely necessary to say, that the covering material may be colored in any way to suit the desire of the manufacturer. The correct performance of this process of covering candles with a very thin coating depends upon the thinness of the metal of which the mould is constituted, and the suddenness of the action of the cooling medium on the immersion of the mould into the cold water; whereas it must be obvious that the same cannot be so delicately and rapidly effected by the employment of thick moulds, made in the ordinary way.

The peculiar constructions of metallic caps to be applied to candles for the purpose of preventing them from guttering whilst burning, and also for conducting a detached wick, will be seen by reference to the drawing. Figs. 2, represent, in several views, a simple cap of thin metal, to be placed on the top of any candle. This cap is to be placed on the top of a candle, which, as it burns, will be prevented from guttering by the cap descending, the lip or rim round its edge guiding it, and preserving it in its proper position. This cap may be of any form suitable for the candle to which it is to be applied. In some cases, the inventor proposes to attach to this cap a circular or elliptical tube of glass, mica, or talc, or other transparent or semi-transparent substance, to act as a chimney, which may be supported by small arms extending from the cap, as shewn in figs. 3. This cap may also have a small metal tube standing in its centre, supported by small arms, for the purpose of holding a short piece of wick, which is to be saturated with some oleaginous material. The cap, with its wick, being placed upon the top of a candle, formed with a hollow channel down its centre, as above described, or upon a solid candle, as shewn at fig. 4, will, on being lighted, heat the oleaginous material below, and gradually descend as the candle burns; the tube and wick continually conducting up the fatty matter, which will support the combustion as long as the candle lasts, and it will not require snuffing; the wick also is capable of being elevated or depressed in the tube, for the purpose of increasing or diminishing the light at pleasure.

The patentee claims the mode of constructing moulds of thin metal for the casting of candles, as described; the novel forms or shapes of candles set out; the mode of producing the peculiar crystallization of the spermaceti or other materials of which the candle is constituted; the novel method of coating or covering the external surfaces of candles; and the peculiar constructions of caps above set out and explained.—[*Inrolled in the Petty Bag Office, January,* 1846.]

Specification drawn by Messrs. Newton and Son.

To John James Sinclair, *of Helmet-row, in the county of Middlesex, hot-presser, for his invention of certain improvements in producing glossy surfaces on paper and similar materials.*—[Sealed 21st July, 1845.]

The ordinary mode of glazing or smoothing the surfaces of paper and similar materials consists in placing the paper, in single sheets, between thin sheets of copper, of rather larger dimensions than the paper, and when a sufficient quantity, say, for instance, one quire of paper, is so arranged between copper-plates, it is passed between a pair of rollers, which are generally made of iron. By this process it has been found, that although the middle of the sheets of paper are properly glazed and made perfectly smooth, the edges are not finished, and nearly always come out rough; thereby rendering it necessary to plough them off after the paper has been glazed, and thus causing great waste, and increasing the labour of preparing the sheets for the market. It is to the remedy of these defects and inconveniences that the present improvements are directed. From the patentee's experience in glazing paper and other materials, he is of opinion that the imperfect manner in which the operation of glazing paper has hitherto been conducted arises principally, if not solely, from the want of a proper bed or elastic medium between the rollers and the material to be glazed, so as to render the pressure uniform over the whole sheet. To effect this, the patentee introduces what he terms a bedding between the rollers, and upon this bedding the sheets of paper, which have been previously placed between sheets of copper or other metal or material, as heretofore, are laid. Instead of operating upon a large number of sheets, arranged in a pile, as formerly practised, the sheets are passed singly, or in small numbers, through the machine.

In Plate V., various plans are shewn for carrying out the object of the invention; but the patentee does not intend to confine himself exclusively to these arrangements, as others may be devised. Fig. 1, represents a vertical section of a machine, constructed somewhat upon the principle of the ordinary roller-machine, and having the improvements attached thereto. *a, a,* is the framing of the machine, made of cast-iron or other suitable material; *b, b,* are two rollers, also made of cast-iron, and hollow, if required, so as to admit steam, in order to heat them if thought desirable; *c, c,* is the elastic bedding, consisting of loose sheets of copper or other metal, with sheets of paper, cardboard, felt, or other suitable substance between them, so as to make them yield slightly when the paper or other material to be operated upon is passed through the machine. Part of the periphery of the under roller, as at *d,* is cut away, in order to allow one end of the loose sheets of metal to be fastened thereto; and in order to prevent the nails, screws, or other fastenings, that may be employed to secure the sheets of metal together, from being injured, when passing under the upper roller, the fastening is countersunk below the surface of the lower cylinder; and its periphery or circumference is made complete by means of a moveable piece *e,* which is hinged, and, when in its place, covers the ends of the sheets *c, c.* The upper roller is mounted in moveable bearings, furnished with set-screws *f, f,* whereby the pressure between the rollers is regulated at pleasure.

The ends of the copper sheets *c, c,* are loose, and made to lap round the lower roller; *g,* is a guide-roller, mounted in bearings connected to the frame-work; and it is between this roller and the elastic bedding *c, c,* that the paper, previously placed between copper or other metal plates, or glazed boards, is introduced into the machine; the sheet or sheets of paper then pass between the rollers, and, if thought desirable, may be subjected to the like pressure two, three, or more times, when they will be finished, and must be removed from between the metal sheets or boards. As the rollers are made hollow, they may be heated, when required, with steam, iron-heaters, or by other means, or they may be used without heat, according to the quality of the paper to be operated upon, and the amount of glaze or finish required.

Fig. 2, represents another form of apparatus, in which a reciprocating motion is employed, as in the ordinary copper-plate printing press, instead of a continuous rotary motion. *a, a,* is the frame-work; *b, b,* the rollers, the upper one of which is furnished with set-screws, for the purpose of regulating the pressure; *c, c,* is the elastic bedding, which, in this instance, is not attached to either of the rollers; *d, d,* is a plank, upon which the bedding *c, c,* is placed; the plank *d,* may, however, be dispensed with, as it is not absolutely necessary, but still it will be found convenient under some circumstances. By communicating rotary motion to the upper roller, first in one direction and then in another, the plank and the bedding *c, c,* will be made to reciprocate to and fro between the rollers, and by placing sheets of paper, arranged between sheets of thin copper or other metal, or glazed boards, on this bedding, and passing them between the rollers, the paper will be perfectly glazed, as in the former instance. It will be understood, that the plank is made of sufficient width and length to take several sheets of paper at one time; and as it may be necessary to pass the sheets through the machine two, three, or more times, a number can be operated upon at once.

Fig. 3, represents another mode of applying a loose bedding of considerable length; but, in this instance, the motion of the rollers is continuous, and they are mounted in bearings, in pairs, or in any other suitable manner—as many pairs of rollers as are thought desirable may be employed. The sheets of paper, arranged between plates of sheet-copper or other metal, or glazed boards, are introduced into the machine between the first pair of rollers, and are carried on in succession from thence between the other pairs of rollers, and after passing between the whole series, the sheets come out perfectly finished, and with as fine a surface as if they had been passed through the first machine four times. The end of the bedding, after having passed through the machine, is turned under and carried back to the front of the machine by the small rollers *o, o*; and every time that the end comes back it is placed between the front pair of rollers by the attendant.

Fig. 4, represents another mode of arranging the bedding, which, in this case, is composed of a number of cylinders, one within another, and sheets of paper, pasteboard, or felt, are placed between these cylinders, as in the former instances, and one of the rollers (in this case the upper roller) is placed within these sheet-copper cylinders, which revolve loosely upon the iron cylinder. In fig. 4, the upper roller is of small diameter, and the lower roller of large diameter, so that the latter is made to revolve more slowly than the upper one, and the paper to be operated upon can be, without difficulty, placed on the periphery of the large roller to a proper mark, and carried through the machine: the upper roller is mounted in moveable bearings, with set screws or levers to regulate the pressure. At the point of contact between the two rollers *b, b*, the metal cylinders are brought into contact, as shewn in the drawing, and pinch the sheets of paper that are introduced into the machine between the two rollers *b, b*. By the copper cylinders revolving one inside the other, and having sheets of paper, pasteboard, felt, or other substance between them, an elastic or slightly yielding bedding is produced, as in the other machines.

Fig. 5, represents this plan of arranging or constructing the bedding, carried out upon a more extended scale; in this instance four upper metal rollers are used, each having its proper number of sheet-copper cylinders to form the bedding. The paper to be glazed is introduced into the machine between the first upper roller and the large roller; *n*, *n*, *n*, are guides, placed between the upper rollers, for the purpose of guiding the paper from the first roller to the one succeeding it.

Fig. 6, is another modification or arrangement, in which three sets or pairs of rollers are employed; but a greater or less number can be used, if desired. The bedding is arranged in the form of an endless band, and consists of a number of endless sheets of copper, with paper, pasteboard, or felt between them, so as to give the bedding a slight degree of elasticity, and to cause it to yield slightly to a heavy pressure, such as when the sheets of paper, between the copper or metal plates, or glazed boards, are passed between the rollers. It will be seen, upon inspecting the drawing, that the bedding is made of concentric rings or cylinders of copper, placed one within the other, as in figs. 4, and 5, and, being endless, will of course work continuously, and the machine only requires feeding with the paper or other material to be operated upon.

The patentee, in conclusion, states that he does not intend to confine himself to the arrangements and constructions herein shewn and described, as they may be further varied without departing from the nature and principle of his invention; but that which he claims is the adaptation, application, or employment of an elastic or slightly yielding medium between the roller or rollers and the paper or other material to be operated upon (which elastic medium he denominates the "bedding"), whether such bedding be attached to one of the rollers or separate therefrom, as before described.—[*Inrolled in the Petty Bag Office, January,* 1846.]

Specification drawn by Messrs. Newton and Son.

To ANTOINE BOSSY, *of Paris, in the kingdom of France, merchant, for improvements in manufacturing waterproof paper.*—[Sealed 10th July, 1845.]

THIS invention consists in manufacturing waterproof paper by subjecting the pulp to the action of certain solutions.

The rags to be used for making the paper are cut in pieces in the ordinary manner, and boiled in water for ten or twelve hours; the pulp is then submitted to the beating-engine, and afterwards placed in a vessel containing a solution of lime, composed of 32 lbs. of lime for 200 lbs. of pulp, with a sufficient quantity of water to form a bath for it. To this solution is to be added another, made by dissolving 3 lbs. of soda in hot water; the solutions and pulp are to be well mixed together, heated by steam or other suitable means, and allowed to remain for some time; the pulp is then taken out, and is ready to be operated upon, according to this invention, for making waterproof paper.

The waterproofing process is as follows:—4 lbs. of psylium (a drug well known to chemists) are dissolved in hot water, and the liquid is strained through a sieve; then 50 lbs. of soap made from resin, or palm or cocoa-nut oil, or any other inodorous fatty matter (or, in place of being saponified, the oils or fats may be used in their natural state), are dissolved in the liquid, and a sufficient quantity of water added to make a bath for 200 lbs. of pulp. The solution is divided into two parts, by measure, and the pulp having had the water drained from it, without pressing, is immersed in one part for three or four hours; during which time the whole is to be well macerated, and the temperature kept up by steam or otherwise; and then the pulp is well strained. A solution of sulphate of alumina is now made, by dissolving 20 lbs. of sulphate of alumina in as much water as will form a bath, and the pulp is immersed in the half of the solution for about two hours; it being kept at a suitable heat during that time. After this the pulp is well drained, and immersed in the other half of the solution of psylium and soap; and on being removed from this solution, it is immersed in the remaining half of the solution of sulphate of alumina. When the pulp has been subjected to the action of these solutions, it may be conveyed to the engine, in order that the beating may be completed; and it is then ready for sizing.

The patentee claims the manufacturing of waterproof paper by submitting the pulp to the repeated solutions or compositions above described.—[*Inrolled in the Inrolment Office, January*, 1846.]

To JOHN EVANS, *of Kensington, in the county of Middlesex, Gent., for a new perazotic product, and its application to the arts,—being a communication.*—[Sealed 7th August, 1845.]

THIS invention relates to the preparation of an artificial manure. The materials employed are, first, animal matters, consisting of muscular fibre, flesh, blood, serum, sour milk, old skins, fish, urine, horn, old woollen rags, refuse of soap-boilers, of slaughter-houses, and of tallow and candle manufactories; secondly, vegetable matters, consisting of humus, rotten or decayed wood, the produce of dunghills and stables, the waters of manufactories where starch and prussiates are made, the waters of dyers, brewers, distillers, and refiners' establishments, and the ammoniacal and other liquors from the gas works; thirdly, mineral substances, consisting of ashes containing potash, soda, phosphates, and silicates.

To convert animal matters into manure, and render them of easy transport, without creating a nuisance or affecting the public health, they are first treated with a decoction of oak bark, combined with about one-tenth of its volume of pyrolignite of iron. This mixture is put into a suitable vessel, and the muscular parts of animals, fish, blood, the remains of skins, and entrails being introduced, are allowed to remain for three days; after which they are taken out and dried, either in the open air, or by the application of heat; they are then free from any fetid odour, and can be easily reduced to powder. A solution formed by dissolving equal parts of sulphate of iron and alum in water, or a mixture of naphtha (to which a small quantity of nitric acid is added), saturated with lime, may be substituted for the decoction of oak bark and pyroligneous acid.

The same results may be obtained by pouring into cesspools, sewers, &c., in small quantities, either a decoction of oak bark, mixed with a solution of sulphate of iron and alum, or naphtha combined with lime, and treated with nitric acid, with one-tenth of its weight of sulphate of iron. But before the disinfecting agent is introduced into cesspools, &c., muriatic acid may be injected, in small quantities at a time, into the open part of such receptacles.

Pure urine, or urine containing a small quantity of feculent matter, should have a little of the disinfecting agent added to it before being removed from the place where it is collected, in order to carry off the fetid gases. It is then introduced into a vessel with a lid, resembling a still-head, and furnished with a tube to carry the gases to the bottom of a butt or vessel, two-thirds full of sulphuric acid, diluted with water, and to every 1000 quarts of the liquid contained in the vessel above mentioned, are added 10 lbs. of a composition, formed by boiling 12 parts of water, 3 of sulphuric acid of 66°, and 2 of fresh bones, in a leaden boiler for seven or eight hours. When this matter has been introduced into the boiler, the mixture is allowed to stand for two or three hours; 1 lb. of magnesia is then added, and the whole evaporated to dryness.

The herbs and plants of which the dunghills of farm-yards are formed are made into heaps in the following manner:—The dunghill being commenced in the ordinary way, a layer of dung, sprinkled with ashes (to which has been added about 25 per cent. of solid offal, arising from the refuse of dyers, manufacturers of prussiates, and tallow melters), is successively added to the top of the heap; openings are formed, communicating with the interior, to allow the gases to escape, or the liquid products above named to be poured on the heap to quicken the fermentation and decomposition of the vegetable matters; and steam-pipes are made to pass through different parts, so as to impart a heat of from 15° to 18° to the mass. The fetid exhalations will be prevented, and the richness of the manure increased, if the whole of the surface, except those portions reserved for the escape of the gases and the introduction of the liquid products, be covered with a mixture of tar and lime. When the decomposition is complete, the mass may be dried, and reduced to powder; then, by mixing this powder with the disinfected animal matters, the new manure is formed, which the patentee terms "British guano."

The patentee claims the mode or modes of making manure above described.—[*Inrolled in the Inrolment Office, February,* 1846.]

To Samuel Brown, *of Gravel-lane, Southwark, in the county of Surrey, engineer, for improvements in the manufacture of casks and other vessels.*—[Sealed 17th June, 1843.]

This invention consists in casing metal casks and similar vessels externally with staves of wood, bound with hoops; by which means casks may be made perfectly tight, and of a very lasting description, with much thinner plates of metal than would be required if no wooden covering were used.

In Plate V., fig. 1, is a longitudinal section of a metal cask, made with a "bulge," similar to ordinary wooden casks, and cased externally with staves of wood. *a*, is the metal cask; *b, b,* the staves; *c, c,* the hoops; and *d,* is a projecting tube, forming the bung-hole.

The heads of the cask are secured by soldering, or by dipping the ends of the cask into fluid metal after the heads have been driven in. In some cases, heads are used with a man-hole or opening formed therein, (as shewn at *e,* fig. 2,) having a cover bolted on or otherwise fastened, in order that the casks may be filled with dry goods, and also that palm-oil or cocoa-nut oil may be dug out, when it comes to this country in a solid state in such casks, instead of melting such oil in the casks.

The patentee claims the mode of making casks or vessels having bulges as above described, whereby a metal cask or vessel is coated or cased externally with staves of wood, bound together with hoops.—[*Inrolled in the Inrolment Office, December,* 1843.

To Alexander Wilson, *of Glasgow, in the county of Lanark, manager of Alexander Fletcher & Co., flax-spinners, Glasgow, for improvements in spinning hemp and flax and other fibrous materials.*—[Sealed 29th July, 1845.]

The object of this invention is to give greater steadiness to the spindles and flyers used in spinning hemp, flax, and other fibrous materials. This is effected by so arranging the spindle and the flyer fixed thereon, that the upper end of the spindle shall turn in a bearing; such bearing being formed in a plate which moves upon hinges, to admit of the full bobbin being removed, and an empty one substituted.

In Plate V., fig. 1, is an elevation of one of the improved spindles, and figs. 2, a plan view and section of its upper bearing; fig. 3, represents another spindle, and figs. 4, a plan view and section of its bearing. It will be seen, on referring to these figures, that the invention is not confined to any particular mode of making the flyer, or of attaching it to the spindle; as in fig. 1, the upper end of the spindle is formed in one piece with the flyer, which is screwed on to the spindle in the manner shewn at *a*; and in fig. 2, an ordinary flyer is used, with a female screw tapped in its socket, to receive a male screw formed upon the spindle near its upper end; *b, b,* are the spindles, which are similar to the common spindles, except that their upper ends are suitably formed for turning in a bearing *c*, in the plate *d*. The upper part of the spindle is hollow, and has a split at *e*, through which the hemp, flax, or other fibrous material *f*, passes down to the flyer. The spindle turns in the ordinary bearings, in addition to the upper bearing *c*. The plates *d*, are usually made long enough to receive twelve spindles, and are hinged to uprights fixed in front of the machine. When the bobbins are full, the workman raises the plate *d*, upon its hinges, and after removing the flyers, takes the full bobbins off the spindles; he then places a series of empty bobbins upon the spindles, fastens on the flyers again, and lowers the plate *d*, on to the upper end of the spindles.

The patentee claims the mode of constructing spindles, with flyers fixed thereon, suitable for spinning hemp, flax, and other fibrous substances requiring similar spindles, and causing them to turn in upper bearings *c*, as above described. —[*Inrolled in the Inrolment Office, January,* 1846.]

To JOHN LINGS, *of Spur-street, Leicester-square, in the county of Middlesex, cheesemonger, for improvements in apparatus for the preservation of provisions.*—[Sealed 21st July, 1845.]

THIS invention consists in certain novel constructions of safes, chests, or closets, for the reception and preservation of victuals and other perishable commodities, in a hot or cold state, as may be required.

In Plate IV., the improved constructions of safes, chests, or closets, constituting the subject of the invention, are shewn in several views. Fig. 1, represents the elevation of one of the improved safes, chests, or closets, for the reception of provisions required to be kept at a very low temperature—the front external part of the safe being removed, for the purpose of shewing its internal construction; fig. 2, is a horizontal section of the same; and fig. 3, is a vertical section taken transversely through the middle of fig. 1. *a*, *a*, is the outer casing, made of wood, with an external door in front, as shewn thrown open at *a**, in fig. 2. The inner casing of the safe *b*, *b*, *b*, is preferred to be of zinc or galvanised iron. Between the two casings *a*, and *b*, powdered charcoal, or sawdust, or hair, or any other imperfect conductor of heat is introduced, and with this non-conducting material the spaces all round the closet (except at the front part) are filled. The interior of the safe is divided into such distinct compartments as may be required, by partitions and shelves *c*, *c*, *c*, by which receptacles are formed to receive different kinds of provisions. In the middle of the safe, a box or vessel *d*, having a perforated bottom, intended to contain ice, is placed, and below this is another box or vessel *e*, to receive the water that may run from the ice as it slowly melts. The vessel *d*, should be kept continually defects and inconveniences that the present improvements are directed. From the patentee's experience in glazing paper and other materials, he is of opinion that the imperfect manner in which the operation of glazing paper has hitherto been conducted arises principally, if not solely, from the want of a proper bed or elastic medium between the rollers and the material to be glazed, so as to render the pressure uniform over the whole sheet. To effect this, the patentee introduces what he terms a bedding between the rollers, and upon this bedding the sheets of paper, which have been previously placed between sheets of copper or other metal or material, as heretofore, are laid. Instead of operating upon a large number of sheets, arranged in a pile, as formerly practised, the sheets are passed singly, or in small numbers, through the machine.

In Plate V., various plans are shewn for carrying out the object of the invention; but the patentee does not intend to confine himself exclusively to these arrangements, as others may be devised. Fig. 1, represents a vertical section of a machine, constructed somewhat upon the principle of the ordinary roller-machine, and having the improvements attached thereto. *a, a,* is the framing of the machine, made of cast-iron or other suitable material; *b, b,* are two rollers, also made of cast-iron, and hollow, if required, so as to admit steam, in order to heat them if thought desirable; *c, c,* is the elastic bedding, consisting of loose sheets of copper or other metal, with sheets of paper, cardboard, felt, or other suitable substance between them, so as to make them yield slightly when the paper or other material to be operated upon is passed through the machine. Part of the periphery of the under roller, as at *d,* is cut away, in order to allow one end of the loose sheets of metal to be fastened thereto; and in order to prevent the nails, screws, or other fastenings, that may be employed to secure the sheets of metal together, from being injured, when passing under the upper roller, the fastening is countersunk below the surface of the lower cylinder; and its periphery or circumference is made complete by means of a moveable piece *e,* which is hinged, and, when in its place, covers the ends of the sheets *c, c.* The upper roller is mounted in moveable bearings, furnished with set-screws *f, f,* whereby the pressure between the rollers is regulated at pleasure.

The ends of the copper sheets *c, c,* are loose, and made to lap round the lower roller; *g,* is a guide-roller, mounted in bearings connected to the frame-work; and it is between this roller and the elastic bedding *c, c,* that the paper, previously placed between copper or other metal plates, or glazed boards, is introduced into the machine; the sheet or sheets of paper then pass between the rollers, and, if thought desirable, may be subjected to the like pressure two, three, or more times, when they will be finished, and must be removed from between the metal sheets or boards. As the rollers are made hollow, they may be heated, when required, with steam, iron-heaters, or by other means, or they may be used without heat, according to the quality of the paper to be operated upon, and the amount of glaze or finish required.

Fig. 2, represents another form of apparatus, in which a reciprocating motion is employed, as in the ordinary copper-plate printing press, instead of a continuous rotary motion. *a, a,* is the frame-work; *b, b,* the rollers, the upper one of which is furnished with set-screws, for the purpose of regulating the pressure; *c, c,* is the elastic bedding, which, in this instance, is not attached to either of the rollers; *d, d,* is a plank, upon which the bedding *c, c,* is placed; the plank *d,* may, however, be dispensed with, as it is not absolutely necessary, but still it will be found convenient under some circumstances. By communicating rotary motion to the upper roller, first in one direction and then in another, the plank and the bedding *c, c,* will be made to reciprocate to and fro between the rollers, and by placing sheets of paper, arranged between sheets of thin copper or other metal, or glazed boards, on this bedding, and passing them between the rollers, the paper will be perfectly glazed, as in the former instance. It will be understood, that the plank is made of sufficient width and length to take several sheets of paper at one time; and as it may be necessary to pass the sheets through the machine two, three, or more times, a number can be operated upon at once.

or other situation where the air has been considerably heated. —[*Inrolled in the Petty Bag Office, January,* 1846.]

Specification drawn by Messrs. Newton and Son.

To THOMAS METCALFE, *of Elizabeth-street, Eaton-square, in the county of Middlesex, brush maker, for his invention of certain improvements in propelling carriages, which improvements are also applicable to driving certain machinery.*—[Sealed 7th April, 1845.]

THIS invention of improvements in propelling carriages, consists in the employment of a rotary treadle in place of the cranks and rods which have been heretofore used in driving certain descriptions of vehicles generally denominated "velocipedes."

In Plate V., fig. 1, is a sectional elevation of the carriage, taken in the line 1, 2, of fig. 2, which figure represents the carriage in plan view; and fig. 3, is an end view of the same. *a, a,* is a rectangular frame, which, in this instance, is supported by three wheels, furnished with springs in the usual way. *b, b,* are the driving wheels; and *c,* is the guide wheel. The axle of the wheel *c,* is carried by the forked piece *d,* (see fig. 3), to the upper part of which a vertical rod *e,* is attached; this rod passes through the ordinary carriage-spring *f,* and through the end framing of the carriage, for the purpose hereafter mentioned. *g, g,* is a drum or wheel, furnished with boards or steps, placed radially, as shewn in the drawing. The axle of this wheel has its bearings in the side framing, and upon it are keyed the pulleys *h, h,* of various diameters, placed at either side of the wheel. Upon the axle of the driving wheels *b, b,* there are pulleys *i,* of varying diameters, which correspond in position with the pulleys *h, h.* Around one of these pulleys *i,* on each side of the carriage, a chain, belt, or cord *j,* is passed, which is carried to the opposite pulley *h,* on the shaft of the wheel or drum *g.* The object of having more than one set of pulleys is, to alter the speed of the driving wheels, which is readily effected by shifting the chain or cord *j,* from one set of pulleys to the other. *k,* is the seat for the driver or traveller, and *l*, the foot-board; *m*, is a break, so placed that the traveller may, by seizing the handle, bring it to bear upon the periphery of the large pulley *h*, and thus check the speed of the carriage when descending a hill, or stop it, if required.

The mode of driving the carriage is as follows:—The traveller standing upon the foot-board or floor l_1 of the vehicle, and resting his hands upon a cross-bar *n*, will raise one of his feet, and place it upon a step of the wheel *g*. By thus throwing his weight on the wheel, it will make part of a revolution, and, through the agency of the chain *j*, which passes round the pulleys *h*, and *i*, communicate a similar motion to the driving-wheels. The traveller will then raise his other foot, and place it upon the next step of the wheel which presents itself, and by continuing this treading motion, the carriage will be propelled at a considerable speed.

In order to guide the carriage the following contrivance is adopted. Upon the cross bar *n*, is a small stud, which serves as the centre of motion for a lever *o*; this lever is furnished with two handles, and is jointed loosely to two parallel rods *p*, *p*, which are connected at their other end to a small lever *q*, (see fig. 2,) fixed on the vertical rod *e*, before mentioned. It will now be seen, that as the lever *o*, is turned, a corresponding movement will be communicated to the guide wheel *c*; the under part of the lever *o*, is supplied with a pin, which fits into the holes of a plate *r*, and is intended to keep the guide wheel *c*, running at any desired angle.

The patentee remarks, that several modifications may be adopted without departing from the nature of the invention; for instance, in place of the chains or cords, and pulleys, it may be advisable to employ cog-wheels upon the axles of the tread-wheel *g*, and the driving-wheels. He also proposes, in place of fixed radial steps to make them slide in a radial groove, so that by drawing them further out the leverage may be increased if required. The break may, if thought desirable, be made to act by the foot instead of the hand, in which case, an upward pressure would be applied to the periphery of the pulleys *h*. By increasing the width of the tread-wheel *g*, two or more persons might be employed in working that wheel, and greater power being thus acquired, the vehicle might be so constructed as to carry passengers.

The patentee claims, the application of a rotary tread-wheel for giving motion to the driving-wheels of carriages, as above described, and shewn in the drawings.—[*Inrolled in the Petty Bag Office, October,* 1845.]

Specification drawn by Messrs. Newton and Son.

To JOHN RYAN, *of Liverpool-street, in the city of London, Surgeon, for certain improvements applicable to or in the construction of casks, barrels, or other vessels, intended to contain wine, beer, fermented liquors, or other liquids or substances which are liable to fermentation or decomposition from exposure to the action of the atmosphere.*—[Sealed 7th December, 1844.]

THIS invention consists in a peculiar method of excluding the air from wine, beer, fermented liquors, or other liquids or substances liable to fermentation or decomposition, which arise from the action of the atmosphere.

In Plate VI., several modes of carrying out the invention are shewn. Fig. 1, represents, in section, a cask for holding fermented liquor for exportation. *a, a,* is the wooden cask, and *b, b,* a flexible bag, which forms an air-tight lining to the interior of the cask. Into this bag (which may be formed of any suitable substance) the liquid is poured through an opening at *c,* which is then closed by a bung or valve. While the bag is being filled with liquid, the air will escape from the cask through the vent-hole *d,* and when the liquor is drawn off, the air will enter the cask at the hole *d; e,* is a common tap for drawing off the liquor.

Fig. 2, shews, in section, a modified arrangement, embracing the same principle of the air-bag, which in this plan floats upon the liquid in the cask, and is in communication with the atmosphere by means of the cock *c.* Supposing the liquor to have been drawn out of the cask *a,* and it is now required to fill it again, the cask is lifted on its end, and the cock *c,* is opened; the liquor is then poured into the cask through the bung-hole *d,* and the air contained in the flexible bag *b*, will be driven out by the pressure of the liquor, which, as it rises in the cask, will expel all the air from the bag. The cask then being full of liquor, and consequently devoid of air, the bung is replaced, and the cask of liquor is fit for exportation to any climate. When the liquid is drawn from the cask, the space vacated by the liquor will be immediately filled by the proportionate extension of the bag into which air must be freely admitted: this cask may be tapped in the same way as the ordinary barrels.

Fig. 3, is a section of a cylindrical vessel for holding beer or any other liquor after it has undergone the process of fermentation. The liquor is drawn from the tun *f*, by opening the cock *g*, in the pipe *c*; it then flows into the cylindrical vessel *a*, and raises the floating piston *b**, to which the flexible bag *b*, is attached; the air, as the piston *b**, rises, is expelled from the bag at *d*, and the liquor, when required for use, is drawn off at the cock *e*. If it is required to detach this vessel from the tun, a valve shewn at *c**, may be applied, which will close the opening for the entrance of the liquor, and allow of the pipe *c*, being removed.

Fig. 4, represents in section a cylindrical vessel, which the patentee denominates a "fermenting vat." In this vessel the action of fermentation is proposed to be carried on, and when the "head" falls, or when it is thought desirable from any cause to stop the fermentation, the flexible bag *b*, furnished with a piston *b**, is applied to the vessel; the upper edge of the bag being secured to the vessel by a cord or other means, as shewn at *c*, *c*; the piston floating upon the top of the liquor will effectually exclude all air, and at once check the fermentation.

In drawing off certain liquids from a full vessel, it is found that the quality differs considerably, according to the depth at which it is drawn, the most pure liquor being generally found in the middle, as the heavy particles or dregs settle at the bottom, and the light particles or scum float upon the top of the liquid. At fig. 5, is a sectional elevation of an apparatus to be employed for drawing off the central or most pure portion of any liquid.

It consists of a cylinder *a*, furnished with a flexible air-bag *b*, at the bottom of which is a piston *b**, which floats upon the top of the liquid. *c*, is a false bottom, having a circular opening at its centre, which forms a recess for the reception of flexible tubes *d*, and *d**, and conical strainer *e*. The upper end of the flexible tube *d**, is attached to the centre of the piston *b**, and the lower end of the tube *d*, is fastened to the bottom of the vessel *a*; the flexible tubes are furnished at their junction with the strainer *e*. *f*, is the valve through which the liquid is introduced into the vessel; and *g*, a cock for drawing off the liquid. The flexible tubes are kept from collapsing by a coiled spring *h*, *h*; the liquid enters the holes in the strainer *e*, and flows down the tube *d*, and through the cock *g*. As the piston *b**, descends upon the decrease in the quantity of liquid, the springs *h*, *h*, will contract the tubes *d*, and *d**, equally, and preserve the strainer *e*, in the centre of the liquid.

Fig. 6, represents a vessel for preserving animal and vegetable matters, and also a plan by which the same may be extracted in small quantities, as required. The vessel *a*, *a*, is, for greater convenience, furnished with pivots, and mounted in bearings on the framing *b*, so as to allow of the bottom of the vessel being turned upwards. Attached to the cover *c*, is the flexible bag *d*, which is open to the atmosphere. The bottom *e*, of the vessel has an opening which is closed by a sliding-piece *f*, connected to the arm *g*; *h*, is a chamber furnished with a cock *i*; this chamber is fastened on to the bottom of the vessel *a*, *a*, by pins or any other suitable means. In order to fill the vessel, the chamber *h*, is removed, and the bottom *e*, turned upwards; the slide *f*, is then withdrawn from the hole, and the substance (whatever it may be) thrown into the vessel; the hole is then closed, and the vessel is exhausted of air, by means of an air-pump in connection with the cock *j*; the chamber may then be attached to the vessel as before. When it is desired to take out a portion of the substance contained in the vessel, an air-pump is applied to the cock *i*, and the air in the chamber *h*, exhausted; the slide *f*, is then drawn back, and the substance will fall down and fill up the vacuum; the slide is then pushed forward again, to cover the hole in the bottom, and the substance thus deposited in the chamber *k*, may be removed. It is almost unnecessary to remark, that the bag *d*, will expand, and fill the space vacated by the substance thus taken from the vessel *a*. By this plan, vegetables of all descriptions, and butter, lard, &c., may be preserved fresh and pure for considerable periods.

In order to facilitate the filling of the casks or tanks to which the improvements are applied, an air-pump may be affixed to the opening which admits the air, and the flexible bag or air-chamber may be quickly exhausted.

The patentee does not confine himself to the particular forms and arrangements of apparatus shewn in the drawing, as many other forms and arrangements may be devised of carrying out the invention; but he claims, Firstly—the application of flexible bags or diaphragms to casks and other vessels as above described, by which the pressure of the atmosphere is or may be maintained upon liquids, and upon animal and vegetable substances confined in air-tight vessels, so as to allow them free egress at the openings or cocks provided for that purpose; and Secondly—the peculiar arrangement of apparatus described with reference to fig. 5, of the drawing, whereby the central portion of any body of liquid may be drawn off from a cask or tank.—[*Inrolled in the Petty Bag Office, June,* 1845.]

Specification drawn by Messrs. Newton and Son.

To CHARLES SEARLE, *of Bath, in the county of Somerset, doctor of medicine, for improvements in stoves.*—[Sealed 9th August, 1845.]

THESE improvements in stoves consist, firstly, in the employment of a heat retaining mass in connection with the fire-chamber, for the heated gases to pass through on their way to the flue, instead of the vessels now in use as the connecting medium between the fire-chamber and the flue. Secondly, in so constructing the fire-chamber or furnace as to obtain solidity of substance, and isolation from surrounding conducting media as far as may be practicable, with confinement of space or closeness of the fire-chamber: the patentee's object being to absorb and retain as long as possible the heat derived from the combustion of the fuel, to prevent its escape, and to concentrate its operation upon the fuel, in aid of its more perfect combustion.

In Plate IV., fig. 1, is a vertical section of a stove made according to this invention. *a*, is the fire-chamber, constructed of fire-bricks, about two inches in thickness; it is of a cylindrical shape (or it may be conical, square, or polygonal, if preferred), and the top is perforated with numerous holes, from ⅛th to ¼th of an inch in diameter, for the escape of the gases from the fire; at the bottom is an iron grating *b*, and beneath it an ash-pit or chamber *c*. *d*, is a packing of sand or clay, between the fire-chamber and the outer cylindrical case of iron *e*, to prevent the radiation of heat at that part; and *f*, is a door-way or opening for the introduction of fuel. The smoke and gases, in their escape from the fire-chamber, having to pass through the apertures in the top (which in time becomes red-hot), are consumed or intensely heated.

Fig. 2, is a vertical section of a stove, having what the patentee terms a magazine-furnace or fire-chamber, the top of which is without apertures, and the gases from the fire pass off through the tubular passages *g*, *g*. The combustion is carried on in the lower part of the chamber; the upper part serving as a magazine or store of fuel.

Besides these methods of constructing fire-chambers, they may be composed of two vessels of a cylindrical or other shape, one within the other; the gases from the fire being allowed to escape between the two by openings in the side of the inner one, which contains the fuel, and is closed at the top; or the current of gases may be made to descend through the body of the ignited fuel and grate, and then pass up between the two vessels, by admitting air above the fuel, instead of from below.

The heat retainer *h*, *h*, of the stove fig. 1, through which the gases have to pass in their course to the flue *i*, is made of slabs or discs of burnt clay or brick, fitting closely within the casing or body *j*, of the stove; they are about two inches and a half thick, and perforated with from twelve to twenty-four holes, about an inch in diameter. One surface of each slab is dished out, leaving a raised border, about half an inch deep, round the margin, in order that when the slabs are placed one above another, so that the perforations may form continuous tubes, there may be an intervening space between them for the admission and circulation of the heated gases;—fig. 3, is a plan view of one of the slabs. The heat-retaining mass may be composed of any number of smaller parts, with intervening spaces for the passage of the gases, instead of the perforations above-mentioned. Or slabs of soft stone or brick, of any shape, may be employed; the gases either passing through openings in the slabs, or circulating between them. Or the body of the stove may consist of a vessel of iron or other material, filled and packed with sand, clay, or other suitable substance, as represented at *k*, fig. 2, through which tubes of metal or pottery *l*, about an inch in diameter, extend; in this arrangement, as well as when perforated slabs or discs are used, a solid mass, of not less than two feet in thickness, is considered desirable. A series of hollow cones, or cylinders of pottery or brick, might also be arranged one within the other, to act as a heat-retaining mass; the gases passing between them. Or a "tubulated cylinder," filled with tallow, oil, or other fluid possessing a great capacity for caloric, might be employed for the same purpose.

The patentee does not confine his invention to stoves for heating apartments; but proposes to apply it also to apparatus for cooking.—[*Inrolled in the Inrolment Office, February,* 1846.]

To FREDERICK BANKART, *of Champion Park, Denmark Hill, in the county of Surrey, Gent., for certain improvements in treating certain metallic ores, and refining the products therefrom.*—[Sealed 7th August, 1845.]

THIS invention relates to all ores containing copper, whether combined with sulphur or not; and consists in adjusting and mixing together the different ores in such a manner, that those ores which contain sulphur in excess may compensate for the deficiency of sulphur in the other ores, and submitting the ores, so adjusted and mixed, to successive roastings and lixiviations, whereby a solution of sulphate of copper is obtained, from which the copper may be precipitated in a refined metallic state.

The method of carrying out this invention is as follows:—The copper ore is first reduced to powder, and the relative proportions of sulphur and copper which it contains are ascertained by analysis; then if the sulphur bears a less proportion to the copper than one to two, iron pyrites or copper pyrites, also pulverized, are added, in such quantities as will bring it to that proportion. If two or more descriptions of copper ores are to be treated, they must be mixed together in such proportions as will make the sulphur of the mixture bear to the copper at least the proportion of one to two; iron pyrites or copper pyrites being added, where necessary, to ensure that proportion of sulphur. And there must always be a sufficient quantity of sulphur ores for the conversion of the copper into a soluble sulphate, and also to allow for the escape of part of the sulphur during the processes. The copper ore, prepared in this manner, is then submitted to such a degree of heat, in free contact with atmospheric air, as will oxidize the metals not already in a state of oxide, and convert the sulphur into sulphuric acid. For this purpose, a common reverberatory furnace is used, and the ore submitted to a dull red heat, in free contact with the air, until the mixture attains a state of seeming fluidity, and it is retained in that state until the evolution of sulphurous vapour nearly ceases: the whole of the mixture is not put into the furnace at once; but it is divided into several portions, and one portion being put into the furnace, another is added when the first has attained a dull red heat, and so on until the whole has been introduced;—the mixture is frequently stirred during the process. The evolution of sulphurous vapour having ceased, or nearly so, the mixture is removed from the furnace to a vat or pit, and water (or a weak sulphate liquor from a previous lixiviation) applied at about the boiling temperature, and retained at that temperature for some time, by means of injected steam, to ensure the solution of the sulphate of copper. When the sulphate of copper liquor is drawn off from the residual mixture, the latter is mixed with as much iron pyrites or copper pyrites as will supply the requisite proportion of sulphur; the whole is then subjected to a second roasting, and to a second lixiviation: this process of adjusting the proportion of sulphur in the mixture, and roasting and lixiviating, is repeated until the whole of the copper is obtained from the ore.

The next process is to precipitate the copper from its sulphate solution; after which it is to be fused, and run into moulds; it is then ready for sale as fine metallic copper. Various modes of precipitation may be adopted; but the patentee prefers to employ cast or wrought-iron plates, keeping the solution at a temperature of from 120° to 150° Fahr., and as nearly as may be of the same strength, by means of a circulating stream of fresh sulphate solution, which, entering at the top, and being conducted by a pipe downwards, tends, by its greater specific gravity, to displace the lighter solution; the latter overflowing is to be returned into the lixiviating vat, to be recharged with sulphate of copper, and this again precipitated, until the refuse liquid becomes a nearly saturated solution of sulphate of iron, when it is set aside to crystallize.

The patentee claims, as his invention, the mixing of the different ores of copper and iron pyrites in due proportion, according to the quantity of sulphur relatively with the copper which they respectively contain, and adjusting them in such manner as that ores which hold sulphur in excess may compensate others which are wholly or partially deficient in sulphur, and subjecting such mixture to a succession of roastings and lixiviations (the residuum, after each roasting, having the proportion of copper to sulphur adjusted as before), and thereby obtaining a solution of sulphate of copper, whence the copper is obtained, by precipitation, in a refined metallic state.—[*Inrolled in the Rolls Chapel Office, February,* 1846.]

To WILLIAM SYMES, *of Victoria-road, Pimlico, grocer, for certain apparatus for dividing lump sugar.*—[Sealed 3rd July, 1845.]

THE apparatus for dividing lump sugar, protected by this patent, is composed of two blades or cutters of case-hardened iron or steel; the lower blade is fixed to a stand or frame, and the upper one is attached to a lever, the fulcrum of which is at one end, and at the other end the power is applied. The several parts of the frame and lever may be made of metal or wood. The edges of the blades may be made with knife-edges, or serrated or indented, with knife edges between the indentations—in such cases, two machines will be required, one with plain, and the other with serrated blades. The apparatus may also be made with one blade partially serrated and the other plain, or with both blades partly serrated; and then only one apparatus will be necessary.

The number of serrations will depend upon the length of the blades: for an apparatus to be worked by hand, the patentee prefers a blade about six or seven inches long, with two serrations, and the end adjoining made with the knife edge mitred round it.

The mode of using the apparatus is as follows:—The large lump or loaf is first broken into pieces in the ordinary manner; these pieces are then taken by the hand, and placed, if necessary, between the two serrated portions of the blades, and the power applied to divide them into strips; which strips are placed between the serrated edges, and divided into pieces for the consumer.

Fig 2

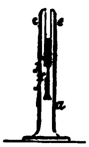

Fig. 1

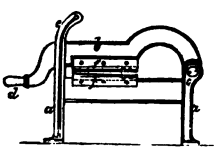

Fig. 1, is an elevation, and fig. 2, a transverse section of the apparatus. *a*, is the frame or stand, to be fixed by bolts or screws on a counter, table, or shelf; *b*, the lever; *c*, its fulcrum; *d*, the handle, working between two guides *e*, *e*, attached to the frame; *f*, *f*, the two blades, which are let into rabbets formed on one side of the frame and lever, and fixed thereto by screws.

The patentee claims, as his invention, the construction of an apparatus for dividing lump sugar, consisting of two blades or cutters, made in the manner described, one fixed to a frame or stand, and the other to a moveable lever, over the lower cutter, with the fulcrum or joint of the lever at its extremity, and the power applied to the other extremity of the lever.—[*Inrolled in the Rolls Chapel Office, January,* 1846.]

To CHARLES WILLIAM FIRCHILD, *of Birmingham, in the county of Warwick, Gent., for his invention of an improved cutting, slicing, grinding, and rasping machine.*—[Sealed 29th May, 1845.]

THIS invention consists in a machine, arranged with a cutting or slicing blade, situated above two rubbing-plates or surfaces, which plates receive the cut substances between them, as the said substances leave the blades, and grind or rasp them for use.

In Plate IV., fig. 1, represents a front view of the machine complete, and fig. 2, a partial side view, shewing the parts by which the cutting, slicing, grinding, and rasping are effected. A, is a standard or frame, which supports the driving parts of the machine; B, is a fly-wheel; C, a cog-wheel, fixed in the shaft of the fly-wheel; D, is a spur-wheel, which takes into the wheel C;—E, is a second standard or frame, which supports the parts of the machine by which the cutting, slicing, and grinding, or rasping is effected; F, is an open feed-box, from which the article to be operated upon is supplied to the blade, either by hand, or by an endless feed-cloth, or by two grooved feeding-rollers, as shewn at *t, t,* in the drawing; and G, is a cutter, suspended by two arms *a, a,* from the front of the feed-box, and kept close up to it by the guides *b, b.* H, is a crank, attached to the end of the fly-wheel shaft, and connected by a rod I, to the cutter G, so that as the fly-wheel revolves, it imparts to the cutter not only a reciprocating, but an alternately rising and descending motion; whereby it operates with much greater power and freedom than the cutters of ordinary machines of this class, and also allows time, after each stroke, for the cut-off material to escape before the return of the cutter, whereby all choking of the machine is prevented. K, K, are two parallel graters or rubbing surfaces, made of iron, millstone, or other suitable material, and grooved or toothed on their inner surfaces (as shewn separately at figs. 3, 4, and 5); these graters hang in bearings L, L, and are caused to move to and fro when acted upon by a double crank M, attached to the end of the shaft of the spur-wheel D, and between which the cut material falls from the cutter G, in order to be ground or rasped. Fig. 5, shews three recesses, as well as teeth, cut on its surface; these plates or surfaces are kept together by the friction-rollers *r*, *r*, acted upon by the adjusting-frame S, S.

The patentee remarks, that gorse or furze, although it affords an excellent food for cattle, has been hitherto but little used for that purpose, in consequence of the prickles in which it abounds; but it may, by this means, be reduced to as soft a mass as hay. In cutting gorse, care must be taken to adjust the cutter to such a gauge that it shall be cut into small pieces, say from an eighth to half an inch, or thereabouts, in length. When the material is of such a nature as not to require any further comminution than it receives from the cutter, the plates K, K, may be thrown out of work, by unkeying the connecting-rods N, N. And in like manner, when the material is desired to be ground and rasped only, the cutting part of the machine may be detached from the rest, by unkeying the connecting-rod I. Figs. 6, 7, 8, and 9, represent two improved grinding-plates, made wedge-shaped, and fitted with a parallel piece X, X, at the bottom of each, so that the movement of the two surfaces, in different planes, causes the toothed and wedge-formed surface of each plate to recede from and approach towards the other alternately, during the progress of the stroke, assuming the positions shewn at figs. 8, and 9, at different parts of the stroke, and thus opening, as it were, or separating to receive a charge of material from the cutter or hopper at one moment, and closing upon it at another to grind or crush it. A plan of a pair of these plates, as applied to the machine, is given in fig. 10.

The patentee claims "the machine hereinbefore described, by the peculiar construction whereof the material subjected to its operation may, after being cut and sliced, be also (when necessary) ground and rasped; and whether such machine is used for cutting and slicing only, or for grinding and rasping only, or both, or any, or either of these processes.—[*Inrolled in the Inrolment Office, November,* 1845.]

To GEORGE GWYNNE, *of Putney, in the county of Surrey, Gent., and* GEORGE FERGUSSON WILSON, *of Belmont, Vauxhall, in the county of Surrey, Gent., for improvements in the manufacture of candles, and in apparatus for and processes of treating fatty and other substances for the making of candles and other uses.*—[Sealed 16th November, 1843.]

THIS invention consists, firstly, in the application to the manufacture of candles of the products of tallow, lard, and other animal fatty and oily substances, and of palm oil and other vegetable fatty and oily substances (except cocoa nut oil) which have been saponified with lime, alkaline earth, or metallic oxide, and afterwards distilled in an atmosphere of steam. Secondly, in treating the products of tallow, lard, palm oil and other animal and vegetable fatty and oily substances, except cocoa nut oil (which have been saponified with lime, alkali, alkaline earth, or metallic oxide, and afterwards distilled in an atmosphere of steam,) with alkalies, to convert such products into soap. Thirdly, in distilling in an atmosphere of steam, tallow, lard, whale oil, palm oil, linseed oil, and other animal and vegetable fatty and oily substances (except cocoa nut oil), after they have been saponified with lime, alkali, alkaline earth, or metallic oxide. Fourthly, in submitting animal and vegetable fatty and oily substances to be distilled in an atmosphere of carbonic acid gas or other suitable gaseous body, to prevent the prejudicial action of the atmosphere. Fifthly, in improvements in apparatus used for condensing and collecting the products of fatty and oily substances when distilling the same in an atmosphere of steam or other gaseous bodies; and in a mode of cleansing out the still used in the distillation of fatty and other oily substances by the use of steam, thus rendering it unnecessary to open the still. Sixthly, in improvements in treating the liquid acids obtained from acidified animal and vegetable fatty and oily substances, by causing such acids subject to the action of the atmosphere to be distilled, and then to be further distilled, the atmosphere being excluded by steam or other suitable means. Seventhly, in distilling rosin oil in a vessel from which the atmosphere is excluded by steam or other suitable means. And eighthly, in saponifying a residuum of fatty or oily substances left in a vessel after a portion has been distilled over, and then distilling the same, the atmosphere being excluded by steam or other suitable means.

In Plate VI., fig. 1, represents a section of the still used for distilling fatty and oily substances. The still A, is about six feet in diameter, and is adapted for working a charge of about 50 cwt. It is made of copper, about ¼th of an inch thick at the top and sides, and ⅜ths of an inch at bottom, and has a small well *a*, in the centre of the bottom. The mode in which it is placed on the fire is shewn in fig. 2. *b*, is a circular flue of about four inches wide all round the still to the top, into which the heat passes on leaving the flue b^1; the circular flue *b*, is connected with the chimney by an opening in its lower part, directly opposite the termination of the flue b^1. The bottom of the still rests on brickwork, and is, besides, supported in the centre by a Stourbridge hump, hollowed to the shape of the still, and having a hole in the centre to protect the well *a*. *c*, is the manhole cover; *d*, a pipe closed at the bottom, and nearly filled with oil, in which a thermometer is placed; *e*, a pipe through which a charge is let in, and the residuum blown out; and *f*, a mercurial guage to ascertain the pressure. *g*, is a pipe connected with the steam-boiler, which works at a pressure of about 4½lbs. to the inch; this pipe terminates at bottom in an ordinary perforated steam-worm, similar to those in use in purifying stearine wax, and by which the steam is admitted into the fat in a very divided state. *h*, is the exit-pipe for the steam and distilled products. In this pipe are two valves, one opening inward, and the other opening outwards. *i*, is a throttle valve. B, is a vessel which the patentees call the boiling-over vessel, for it has been found, in distilling fatty and oily substances with steam, that the fat is liable to boil over, and thereby, soil the distilled products: the use of the vessel B, is to prevent this injurious effect, by intercepting the boilings over. *j*, is a pipe, secured by a union-joint to the bottom of the boiling-over vessel B, and coiled round into the vessel *k*, which may be made of lead, $\frac{3}{16}$ths of an inch thick. The pipe *j*, passes from the bottom of the lead vessel, and is connected with the pump *l*, by which the soiled product is pumped back through the pipe *m*, into the still; m^1, is a small cock, for drawing off any water or fat which may condense in the pipe *m*. Although the vessel B, is used for the purpose of intercepting the boilings-over, it also condenses a part of the distilled product. The boilings-over take place chiefly at the earlier stages of the operation, and when they cease it is no longer advisable to return the pure distilled fat into the still. The state of the operation may be examined, from time to time, by means of the small cock m^2, which also serves the purpose of discharging the water condensed in the vessel B, at the commencement of the operation. As soon as the boilings-over are found to have ceased, the pump is no longer worked, and the cock *n*, (which is a three-way cock) is opened, and the condensed fat runs through that cock into a suitable vessel. The vessel *k*, is simultaneously filled with water through the water-pipe *o*, for the purpose of reducing the temperature of the fat. In case of the fat being too much chilled, so as to stop the pipe *j*, it may be heated, by admitting steam into the water through the perforated steam-pipe *p*. The cock *q*, is for the purpose of ascertaining whether there is any accumulation of fat in the boiling-over vessel B, or any stoppage in the pipe *j*. *r*, is a cock for drawing off the water out of the vessel *k*, when the use of the pump is to be resumed. When the pump is not working, it is advisable to admit steam into the pipe *j*, through the steam-pipe *s*, for the purpose of preventing the pipe from being clogged with fat. As the fat is sometimes very hot, soft solder must not be used for connecting the parts. The arrangement which the patentees prefer is shewn on an enlarged scale in the section fig. 3. The joint *n*¹ is made by flanges bolted together; the inner halves of the faces of these flanges are slightly raised, so as to bite the lead tight, and the bolts are made tight with lead washers. The other joint *n*², is made by flanges not raised, but having a lead collar between them.

The mixed vapours which are not condensed in the boiling-over vessel B, pass by the pipe *t*, into the condensing apparatus, fig. 4. The object of this part of the apparatus is as follows:—In distilling fatty and oily substances with steam, the distilled products are apt to form a soapy emulsion, which has a great tendency to clog an ordinary worm, but the patentees have found, that by causing the combined vapours to traverse the pipes *u*, the greater part of the vapour of the fat drops in a condensed state into the boxes *v*, leaving the steam, or the greater part thereof, to pass onward with a continually-decreasing portion of fatty vapour mixed with it into the last pipe *u*¹, where the mixed vapours are condensed by means of a stream of water passing through a rose-head *w*, and are received into the tank C. In order to facilitate the separation of the fat from the condensed water, the tank C, has a pipe *x*, issuing out near the top, and extending to within a few inches from the bottom, by which there is a continual discharge of water from the bottom, leaving the fat to collect at the top. Each of the boxes *v*, is provided with a tube *v*¹, closed at the bottom, and open at the top, partially filled with oil, and having a thermometer inserted therein; there is also a trial cock *v*², for the purpose of ascertaining whether there be any accumulation of fat in the box; and to the bottom of each box is connected, by a union-joint, the coil of copper-pipe *v*³, which is placed in a vessel *y*, provided with a water-pipe *o*, and a steam-pipe *p*, similar to those before described.

Fig. 5, shews a transverse section of one of the vessels *v*, with its coil of pipe. It will be perceived, by inspecting this figure, that the coiled pipe turns upwards to some height. The object of this is to prevent the egress of uncondensed vapour, by keeping the pipe full of fat.

In one of the upright pipes *u*, is inserted a pressure-guage, for the purpose of ascertaining whether any difference of pressure exists between the condensing apparatus and the still.

Fig. 6, shews a mode of forming union-joints, which the patentees have found suitable for high temperatures. One part of the union-joint is accurately turned in the shape of a hollow cone, and the other part of the union-joint has its shoulder turned into a globular shape, which makes a tight joint, by ensuring metallic contact when it is screwed together. Fig. 7, is an enlarged view of the throttle-valve shewn at *i*, in fig. 1. i^1, is the spindle, having a slot down the centre, through which the valve is inserted, and is secured in its place by the screw i^2. i^3, is the shoulder of the spindle, working on a conical seat, so as to make a tight moveable joint; it is retained in its place, and adjusted, from time to time, by means of a ring i^4, having a small screw formed on its circumference, working in a corresponding female screw. D, is the vessel from which the still is charged. It holds about 50 or 60 cwt. of fat, and is filled by means of a pump, through the pipe E. At the bottom of the vessel D, is a coil of closed steam-pipe F, connected with the steam-boiler, for the purpose of keeping the fat heated; G, is a solid plug or valve, retained in its place by the rod G^1, which passes through guide-rods. The upper guide-rod has a female screw cut in it, and a corresponding male screw is cut on the rod G^1, so that the valve G, can be opened or shut by turning the rod G, by its handle G^2; the valve-seat is connected with the charge-pipe *e*. H, is a small steam-cock, connected with the steam-boiler, for the purpose of heating the pipe *e*, and the pipe I, hereafter described. J, is the residuum vessel, furnished with two valves, one opening inwards, and the other opening outwards; it is connected with the charge-pipe *e*, by means of the bent pipe I. K, is a large cock, which opens and shuts the communication between the still and the vessel J; and L, is a cock for the purpose of drawing off the residuum from the vessel J, as may be required. M, is a small cock for drawing off the condensed water; it is unscrewed, on ceasing to work the still, in order to admit the air, and thereby to prevent the formation of a vacuum, which might cause an ascension of fat into the pipes,—there is a similar air-plug O, in the steam-pipe *g*.

The mode of working with the above apparatus is as follows:—Let it be supposed that the charging vessel D, is filled with fat, at a temperature of 190° Fahr. The steam is let in through the worm *g*, into the still A, for the purpose of heating it. At the same time the small steam-cock H, is opened for the purpose of heating the pipes *e*, and I, and the small cock M, is opened for the purpose of discharging the condensed water formed by these operations. In a short time the still will be sufficiently hot, which will be known by the steam passing, uncondensed, into the boiling-over vessel B, and into the condensing apparatus. When this takes place, the cock H, and throttle-valve *i*, are shut. In a short time the steam gains such pressure as to force the condensed water, formed in heating the still, through the pipe I, and the cock M; as soon as the water is discharged, which is known by the steam passing, uncondensed, through the cock M, this cock is shut, and the throttle-valve *i*, opened. Immediately afterwards the valve G, is opened, and the fat begins to flow into the still; and when the still is charged, the valve G, is closed. The cocks H, and M, being then opened, the steam forces the fat remaining in the pipe I, through the cock M, into a suitable vessel. The pipes *e*, and I, are filled with steam, during the remainder of the operation, for the purpose of keeping them hot. The admission of steam into the still is continued throughout the entire process; and the patentees observe, that steam might be generated for this purpose, by admitting water into the still. The fire under the still is now lighted.

At the commencement of the operation, there will be a condensation of water in the boiling-over vessel B; this water is allowed to escape, by opening the cock m^2, which is kept open until it is found to be principally fat which it discharges. The cock m^2, is now shut, and the cock m^1, is opened, to empty the pipe *m*, of condensed water; and when this is done the cock m^1, is shut, and the pump *l*, is worked, for the purpose of throwing back the soiled fat into the still. This pumping back is continued until the fat condensed in the vessel B, is found to be in a sufficiently pure state; the working of the pump is then stopped, the three-way cock *n*, is opened, the vessel *k*, is filled with water, and the product is drawn off at the cock *n*; at the same time the cock to the steam-pipe *s*, is opened, for the purpose before explained; and while this is going on, portions of condensed fat collect in the boxes *v*, and pass off through the pipes v^3. The vessels *y*, are to be filled with water, and the trial-cocks v^2, examined, from time to time, for the purpose of ascertaining that no stoppage takes place in the pipes. Shortly after the fire is lighted, the injection water from the rose-head *w*, is turned on, and after a time some fat reaches the pipe u^1, with the steam, and is condensed in the vessel C. When about three-fourths of the charge has been distilled over, the fire is drawn, and the flues opened for about a quarter of an hour, for the purpose of cooling the still; after which the residuum is discharged, in order to commence a fresh operation. This is effected in the following manner:—The cock H, is shut, the cock M, is opened, and the throttle-valve I, is shut; in a short time the pressure of the steam will have accumulated to such an extent in the inside of the still as to force the residuum through the pipe I; when it begins to shew itself at the cock M, that cock is immediately closed, and the cock K, is opened; and the residuum continues to be forced out by the pressure of the steam, until it has entirely passed into the residuum vessel J. The completion of the operation will be known by the escape of steam at the valve P. The cock K, is now shut, the throttle-valve opened, and a fresh charge being let in, by raising the valve G, the operation of distilling is repeated.

The residuum obtained in the above-mentioned process, and other processes of distilling fatty and oily substances, (whether previously acidified or not) is usually of a dark color, and is not adapted for being profitably distilled. This defect appears to arise, in the process above described, from a portion of the fat having escaped the process of saponification, and the patentees have found, that if a residuum, obtained in the distillation of such fatty or oily substances, is saponified and decomposed in the usual way, and then submitted to distillation with steam, valuable products can be obtained. The last-mentioned distillation is effected in the manner above described, except that it is not deemed advisable, in using a copper still for the purpose, to draw over more than one-half of the charge, lest injury should arise from a deposit forming on the bottom of the still. The ultimate residuum is transferred to a cast-iron still, and distilled with steam to dryness. If the fatty product of the distillation of a residuum is found to be highly colored, it may be redistilled before being applied as hereinafter mentioned.

The distilled products obtained by the above processes are treated as follows:—If hard fats, as tallow, lard, or palm oil, they are to be subjected to pressure, in the usual manner of the stearine wax manufacture; liquid fats, as whale oil, should be bagged or filtered, in the first instance, and the solid matter obtained thereby then pressed, as aforesaid. The hard products obtained by pressing the distilled fatty or oily substances are to be made into candles. This may be done in the usual manner of making stearine wax candles, except that rather smaller wicks should be used, on account of the greater inflammability of the distilled fats. The pressed products may also be used with other fatty materials in the manufacture of candles. The liquid acids, obtained in the several processes above described, may be treated with suitable alkalies for the purpose of being made into soap. The entire fatty product of the distillation may also be treated with alkalies, and made into soap in like manner.

The liquid acids of fatty or oily substances, obtained by the above-mentioned or other processes (termed oleic acid), contain some substance, which, in a great measure, unfits them for burning in lamps. This defect the patentees propose to obviate to a considerable extent, by first distilling the oleic acid, exposed to the action of the air, for the purpose of producing a change in its constitution, and then distilling it once, or several times; the air being excluded during the process, by the admission of steam or by other suitable means. For common tallow oil the patentees prefer one distillation in the air, followed by two distillations with the air excluded, and the tallow oil will require to be bagged, after the last distillation, in order to remove the solid matter contained in it. The lamps used for burning oils of this description should be made of, or covered with, a material not acted upon by fatty acids,—electro-plating the interior of the lamp will produce the desired effect.

Another part of this invention relates to the distillation of an oil commonly called "rosin oil," which, as now produced, is of a very inferior quality, and only used for the most common purposes; but by distilling it with the air excluded, by steam or other suitable means, improved products may be procured. The rosin oil may be distilled in the apparatus before described, or the distilling may be otherwise performed, so long as the atmosphere be excluded. It is preferred to distil over about three-fourths of the charge, and then to blow out the residuum. The distilled product is re-distilled in like manner, but in this second distillation a small residuum is left; and the oil may be still further distilled, until sufficiently pure. The several residuums are to be mixed together and subjected to a process of ordinary distillation, similar to that by which the crude rosin oil is obtained. This part of the invention is not only applicable to the ordinary once-distilled rosin oil of commerce, but also to rosin oil which has been several times distilled under the access of the air.

Although steam is the agent which the patentees prefer to use, in the processes hereinbefore described, for the purpose of preventing the contact of the atmosphere, suitable gaseous bodies, which do not act prejudicially on the fat, may be used as a means of excluding the air, as well in those processes as in other processes of distilling fatty and oily substances. The gaseous body which is considered the best for this purpose, next to steam, is carbonic acid gas, which may be generated in the manner adopted in the soda water manufacture, or by other convenient means, only it will not be necessary to work under a pressure of more than about 4¼ pounds to the inch. The apparatus hereinbefore described, as employed with steam, is also suitable for carbonic acid gas; but as the preparation of this gas is expensive it will be desirable to save it, which might be accomplished by allowing the last of the upright pipes u^1, fig. 4, to terminate in a large air-tight metal vessel, surrounded with cold water, instead of being provided with the injection rose *w*, and the pipe belonging to it; the gas being pumped therefrom back into the gasometer, and the vessel being opened occasionally, in order to remove the fat condensed therein.

The patentees claim, First, the application to the manufacture of candles of the products of tallow, lard, and other animal fatty and oily substances, and of palm oil and other vegetable fatty and oily substances (except cocoa-nut oil), which have been saponified with lime, alkali, alkaline earth, or metallic oxide, and afterwards distilled in an atmosphere of steam. Secondly,—the treating of the products of tallow, lard, and other animal fatty and oily substances, and of palm oil and other vegetable fatty and oily substances, except cocoa-nut oil (which have been saponified with lime, alkali, alkaline earth, or metallic oxide, and afterwards distilled in an atmosphere of steam), with alkalies, to convert such products into soap. Thirdly,—the distilling, in an atmosphere of steam, tallow, lard, whale oil, and other animal fatty and oily substances, and palm oil, linseed oil, and other vegetable fatty and oily substances (except cocoa-nut oil), after they have been saponified with lime, alkali, alkaline earth, or metallic oxide. Fourthly,—the submitting of animal and vegetable fatty and oily substances to be distilled in an atmosphere of carbonic acid gas, or other suitable gaseous body, to prevent the prejudicial action of the atmosphere. Fifthly,—the mode of arranging apparatus used for condensing and collecting the products of fatty and oily substances, when distilling the same in an atmosphere of steam or gaseous bodies, as above described; and also the mode of cleansing out a still by the use of steam,—thus rendering it unnecessary to open the still. Sixthly,—the mode of treating the liquid acids obtained from acidified animal and vegetable fatty and oily substances, by causing such acids to be distilled, subject to the action of the atmosphere, and then to be further distilled, with the pressure of the atmosphere excluded by steam or other suitable means. Seventhly,—the distilling of rosin oil with the presence of the atmosphere excluded by steam or other suitable means. And, Eighthly,—the saponifying the residuum of fatty or oily substances left in a vessel after a portion has been distilled over, and then distilling the same with the presence of the atmosphere excluded by steam or other suitable means.—[*Inrolled in the Inrolment Office, May,* 1844.]

To JOHN GREENWOOD, *of Church, in the county of Lancaster, manufacturing chemist;* JOHN MERCER, *of Oakenshaw, in the county of Lancaster, chemist and calico printer; and* JOHN BARNES, *of Church, in the same county, manufacturing chemist, for certain improvements in the manufacture of certain chemical agents used in dyeing and printing cotton, woollen, and other fabrics.*—[Sealed 8th July, 1845.]

THIS invention consists in manufacturing stannate or stannite of soda or potash in a dry, crystalline, or pasty state, and in producing the tin-preparing liquor used for dyeing and printing fabrics (hitherto made by mixing oxymuriate of tin with dilute caustic soda), by dissolving the same in water.

The following is the mode of manufacturing stannate of soda:—22 lbs. of caustic soda are first put into an iron crucible, heated to a low red heat by a fire beneath; then, after evaporation has taken place, so as to produce hydrate of soda, 8lbs. of nitrate of soda and 4 lbs. of common salt are introduced; and when the mixture is at the fluxing heat, 10lbs. of feathered block-tin are added, and it is stirred with an iron stirrer. The mass now becomes dark colored and pasty, and ammonia is given off (the tin decomposing the water of the hydrated soda and part of the nitrate of soda); the stirring is continued, as well as the application of heat, until deflagration takes place, and the mass becomes red-hot, and of a pasty consistence. This product is stannate of soda, which, being reduced to powder when cold, is ready for use; or, if it is required to be in a more pure state, it is dissolved and crystallized; or it may be dissolved and evaporated to a pasty state, so dry that no fluid will run from it.

Stannite of soda is made by putting 4 lbs. of common salt, 13½ lbs. of caustic soda, 1 lb. of nitrate of soda, and 4 lbs. of feathered block-tin into a hot iron crucible, over a fire, and stirring and boiling to dryness; the stirring of the dry powder being continued as long as any ammonia is given off: this dry powder is stannite of soda.

To produce the tin-preparing liquor, three pounds of stannate of soda are dissolved in one gallon of boiling water, and three gallons, or more, of cold water are added, to bring it to the required strength. The stannite of soda is used in the same way.

The stannate or stannite of potash may be prepared in a similar manner to the stannate or stannite of soda.

The patentees claim, as their invention, Firstly,—manufacturing stannate and stannite of soda and potash in a dry state, or in crystals, or in a state of paste. Secondly,—manufacturing stannate and stannite of soda and potash by fluxing nitrate of soda or potash and tin. Thirdly,—making tin-preparing liquor, for dyers and printers, by dissolving in water stannate or stannite of soda or potash, which has been manufactured in a dry, crystalline, or pasty state.—[*Inrolled in the Inrolment Office, January,* 1846.]

To WILLIAM SIMMONS, *of Oldham, in the county of Lancaster, hat manufacturer, for certain improvements applicable to hats, caps, and bonnets.*—[Sealed 3rd July, 1845.]

THIS invention consists simply in the introduction of a reflector or mirror into the crown of an ordinary hat, cap, or bonnet, which, when placed in the interior of the "tip" or crown of the same, adds much to the beauty, utility, and apparent lightness of character, as the speculum receives the reflection of the person looking into the hat.

The reflector is preferred to be convex, and made of thin light glass (very similar to the glasses used commonly before the faces of small watches), and must be silvered inside. Or it will be evident, that any polished metallic surface might be substituted, and that such reflector might be made concave, or plane, but that would neither be so elegant nor convenient as the convex reflecting mirror. The reflector may be applied to the hat, cap, or bonnet, by pasting or glueing over the edges of the circular mirror a piece of paper, having a circular aperture cut in it, which thus acts as a frame, and attaching this paper to another piece, made to the crown of the hat, as an ordinary lining; the whole is then to be covered with an interior lining of silk, satin, or other suitable material, having also an aperture or opening in it, through which the mirror is visible.

The patentee states, that he is aware several modifications of preparing the mirrors or reflectors for the above purpose may be made; and also that some mechanical contrivances may be usefully employed for introducing and fixing the said mirrors or reflectors into their respective situations; but such he does not intend to claim as any part of his invention. That which he claims is, the introduction or application of mirrors or reflecting surfaces to the interior of the crown or "tip" of hats, caps, and bonnets.—[*Inrolled in the Petty Bag Office, January,* 1846.]

To Thomas Bazley, junior, *of Manchester, in the county of Lancaster, cotton-spinner, for certain improvements in tube-flyers, used in machinery for roving and slubbing cotton and other fibrous substances.*—Sealed 22nd May, 1845.]

This invention applies to that part of the ordinary machinery employed in the preparation of cotton, &c., for spinning, called "tube-flyers," which are well known to the practical manufacturer, and used for conducting and winding on to the bobbin the rovings or slubbings as they proceed from the front of such machines.

The improvement consists in coating, covering, enamelling, glazing, japanning, or otherwise lining the interior of the tube of these flyers, through which the rovings or slubbings pass, by the application, employment, or use of any well-known glaze, japan, varnish, enamel, or other such lining, coating, or covering, for the purpose of rendering the interior of such tube perfectly smooth, and thereby preventing, in a great measure, the imperfection occasioned by the friction and abrasion upon the rovings or slubbings at present experienced in such machinery.

The patentee claims the coating, covering, enamelling, glazing, japanning, or otherwise lining the interior or passage of the hollow arm of tube-flyers, by means of the fusions or laminations of any metallic substances, or the application of japan, varnish, enamel, glass, paint, or any other suitable lining.—[*Inrolled in the Petty Bag Office, November,* 1845.]

Specification drawn by Messrs. Newton and Son.

To JOHN BOWER BROWN, *of Sheffield, merchant, for improvements in combining cast-steel with iron, and in the construction of carriage-springs.*—[Sealed 10th October, 1844.]

THE first part of this invention consists in a mode of combining cast-steel with iron when manufacturing tires for railway wheels.

A block of iron is provided, of such weight as will, together with the steel, make the size of bar required for the tire of a railway wheel; this block is heated to nearly the point of fusion, and placed in a cast-iron mould, of a suitable size to contain the iron and the cast-steel to be combined therewith; melted steel being now poured in, the steel and iron combine into one mass, which is then drawn out into a bar, and afterwards passed between grooved rollers, in order to obtain the desired form of tire.

The second part of this invention relates to improvements in those descriptions of carriage-springs composed of a series of plates, which move or slide on each other. One improvement consists in forming channels, grooves, or recesses in the surfaces of the plates, to contain grease or other lubricating matter, which will gradually work out from the grooves or recesses, as the springs are used, and thus keep them properly lubricated. Another improvement consists in forming such descriptions of carriage-springs of two widths of plates, instead of all the plates being of one width, as usual. To illustrate this, suppose a carriage-spring to consist of plates three inches wide; now, if it were made according to this improvement, a plate, two inches wide, would be introduced between every two wide plates; hence the spring would not have so much extent of rubbing surface between the plates as when the plates were all of one width.

The patentee claims, as his invention, Firstly,—the mode of combining cast-steel with iron when manufacturing railway-tires. Secondly,—the mode of constructing carriage-springs by forming grooves or recesses in the plates, as above described; also the mode of constructing carriage-springs by combining plates of different widths.— [*Inrolled in the Inrolment Office, April,* 1845.]

Scientific Notices.

REPORT OF TRANSACTIONS OF THE INSTITUTION OF CIVIL ENGINEERS.

(Continued from page 61, Vol. XXVIII.)

April 1, 1845.

Sir JOHN RENNIE, President, in the Chair.

"On the Construction and Use of Gas Meters." By Alexander Angus Croll, Assoc. Inst. C. E.

THE use of gas for the purposes of illumination has now become so general in this country, and involves so much capital in its production and distribution, that any invention by means of which gas can be more accurately measured than heretofore, becomes of importance.

To honest consumers an accurate measurement of the quantities used is a direct saving; for gas companies will, for their own protection, establish their scale of contract charges sufficiently high to cover all contingences. Some idea may be given of the inefficacy of contracts, when it is stated that warehouses, shops, &c., which were supplied with gas for the purposes of illumination only, have been heated during the entire day from the ordinary burners, by merely substituting an iron cylinder for a glass chimney around the flame, so as to hide the light, and an inspector from the company might enter without detecting the fraud. These and other uncertainties in the amount of gas used by the consumers must therefore be met by a price high enough to remunerate the gas manufacturers for the largest quantity which they believe may be used under any circumstances. There is also no doubt that various devices have been resorted to by unprincipled consumers to make their actual consumption appear considerably less than it really was, and thus a large quantity of the gas produced was not accounted for; but the manufacturers were compelled to divide the cost of it among all the consumers, and to make a proportionally high scale of prices. The fair consumer was thus not only made to pay for his own consumption, but to contribute towards that of his dishonest neighbours. The public therefore has an immediate interest in the exact measurement of gas.

But if it be important to the consumers of gas that it should be accurately measured, how much more must it concern the gas companies! To them the subject is one of extreme interest. It is well known that as much as from 30 to 40 per cent. of the whole quantity of gas produced, is sometimes unaccounted for, and this great and positive loss has generally been attributed to leakage. That there is a certain constant amount of leakage through the pores of the metal of which the mains and pipes are composed, is undeniable. The fact of such leakage is proved by the saturation of the ground in which the mains are imbedded, though it would appear to have been somewhat hastily assumed that such saturation would furnish a complete explanation of the whole of the known loss. The erroneous character of this opinion can be readily demonstrated by experiment. The most minute jet of gas can be detected by the smell; for instance, any escape of gas which can scarcely be discovered by its igniting, upon the application of fire to the spot, is instantly perceived by the offensive odour. In the author's own house a very small escape of gas took place. This was so offensive, that its continuance would have rendered the room uninhabitable; but when estimated by the meter, it was found to be only one per cent. Further, escapes of gas in the streets have been detected by the smell, which, when traced, were found to be incredibly small, when the nuisance they had occasioned was taken into consideration. These facts shew that it is impossible to account for even 5 per cent., instead of upwards of 30 per cent., of the ascertained loss, which is the utmost allowance to be made for loss from bad joints and porous metal in the mains.

Practical observations, made in the performance of his professional duties as superintendent of gas-works, have convinced the author, independently of theory, that such an amount of leakage is impossible; for if even 5 per cent. of loss really occurred in that way, the streets through which the gas passed would be absolutely intolerable.

The amount of gas daily distributed from the works of the Chartered Gas Company alone may be taken at about 2,700,000 cubic feet; the loss of 30 per cent. upon that quantity would occasion 810,000 cubic feet of carburetted hydrogen, to be set free daily in a comparatively limited district of the streets of London. It may be objected, that the gas escaping in the soil becomes decomposed, and that therefore no smell is observed; but this hypothesis is inadmissible, as in that case the hydrogen would be formed into water, and the carbon would be deposited in the soil; therefore the quantity, by weight, annually left in the soil, from the supposed escape of 30 per cent., would be upwards of 3,000 tons.

This is from the works of one company only; and if we consider the enormous additional quantity that would be produced from the other ten metropolitan companies, we cannot avoid pronouncing it to be utterly impossible.

In the course of a tour of inspection made recently through some of the principal gas-works of Manchester and Scotland, the author found that there was in fact very little, if any, practical loss of gas; but that it was nearly all accounted for. Almost all that was made by the companies being conveyed to, and paid for, by the consumers.

There was, however, both in Manchester and Scotland the same appearance of saturation in the ground through which the mains passed, as in London. The metal of which those mains was composed was identical, and yet the Manchester and Scotch companies were paid for fully 25 per cent. of gas, which in London was totally unaccounted for, and was wasted. It could not be doubted that this advantage was obtained, by the whole of the gas being consumed by meter, under a judicious system of inspection. It must therefore be concluded that the great loss of gas in London may be attributed to surreptitious consumption.

The author's experience has furnished him with numerous instances, in which persons have been detected in the use of contrivances to consume more gas than their meters indicated. In one case a publican was suspected of some proceeding of this kind; but the gas company's inspectors could never detect anything wrong. The meter, which was placed in a cellar, always indicated an extremely small consumption, and the publican was anxious to explain the exertions which he continually made to economise gas. Still the officers were not satisfied; but whenever they went to the premises they could never obtain immediate admission to inspect the meter. There was always some special reason why they should call again in an hour, or the next day, though at their regular and anticipated quarterly visits none of these delays took place. An observation satisfied them that more gas was consumed on the premises than was accounted for. At last, by stratagem, the inspector obtained admission to the cellar without any previous notice, and he found that the pipes had been unscrewed from the meter, and were connected together by means of a straight tube, and thus about two-thirds of the estimated consumption for that house was an absolute loss to the company. This case was the more remarkable, on account of the consumer being a leading member of a society for the prevention of fraud. In other cases, either a bladder was used, or what was termed "a jerry" passed behind the meter, to connect the service-pipe with the fittings, without any communication with the meter.

The ordinary wet meter is necessarily placed in the basement, in order to receive the water which, rising as vapour out of the meter, is condensed in the fittings. The meter is therefore almost always in a dark cellar or an obscure corner, and in some instances fraudulent methods have actually been in existence without detection, during the inspection by the company's officers.

The extent to which these practices have been discovered, and the facilities which are afforded to the dishonest portion of the community for rendering the water meter ineffectual, together with the excess of consumption by the contract consumers, leaves no doubt that they prevail so widely as fully to account for the whole loss, hitherto attributed to leakage.

It will be obvious, that by the method of measuring gas by wet meters placed in dark cellars and obscure corners, the gas companies must depend upon the vigilance of their inspectors, to an extent which is neither wholesome for the servant, nor secure for the employer. The introduction of a good meter has become, therefore, extremely desirable, and that which is the joint invention of Mr. Richards and the author, will, it is believed, prove a remedy for many of the evils which have been complained of. It can be placed in any position, even in the most conspicuous situations, and admits of precautions and checks, by which all surreptitious consumption of gas may be entirely prevented. The inspectors of the gas companies may thus obtain an exact knowledge of the consumption for each house, and the great saving effected by bringing the extra quantity, of more than 30 per cent., of gas, into the estimate, will enable the manufacturers to lower their prices with profit to themselves, which will extend and increase the use of their production.

It is well known that the water-meter, invented by Clegg, and improved by Crossley, is substantially the same as that now generally in use. It is ingeniously constructed for measuring gas, and with proper inspection, in the hands of honest people, and of those who do not understand the art of disarranging its water-level, it is a sufficiently accurate instrument. But there are the numerous difficulties, before alluded to, in the way of complete inspection, and, unfortunately, there are too many persons who understand the methods of rendering this meter inoperative, and who do not scruple to adopt such means of defrauding the manufacturers of gas.

The action of the water gas-meter is generally understood. The gas is introduced at a central opening of the measuring drum, which is sealed with water; the pressure is exerted upon the surface of the water, and the diagonal divisions of the revolving wheel, which is the measuring chamber of the water-meter. The revolutions of the wheel, caused by the passing of the gas, are shewn by the index. Now the effect of this meter can be easily evaded by various methods. The correctness of its measurement depends entirely upon the water in the meter being kept at the proper height; thus, for instance, if the case of the meter be tilted forward to an angle of from 5° to 13° (according to its construction), and a proportion of the water drawn off, so as to unseal the outlet of the measuring chamber, the gas passes through it without affecting the index, and without being registered at all. This is constantly done, and to an extent of which gas companies are little aware. Whenever the practice has been detected, the parties defrauding have attributed it to accident, and unfortunately the companies have no means of proving the design of thus surreptitiously obtaining gas.

During the winter, the water contained in the wet meter is sometimes frozen; and then it is necessary, in order to enable the gas to pass through to the fittings, that the meter should be removed. The bad example of avoiding the measurement of the gas, until a fresh meter can be substituted, is thus set by the company itself. The number of new meters required on such occasions is so great, that a considerable period often elapses before the frozen meter can be replaced.

To meet these admitted evils, various kinds of dry meters have been at different times invented; but hitherto they have been open to such serious objections as to prevent the general adoption of them in practice. The first machine of any importance was that of the Dry Meter Company. The material of which the measuring-chamber of that meter was formed was leather, which has been found liable to several objections. If the meter is used only occasionally, at intervals, the action of the gas upon the leather produces considerable contraction, and causes a registration of an increased proportion against the consumer. On the other hand, when the meter is in constant use the leather is expanded, whereby more gas passes into consumption than is marked by the index. This of course operated unfairly against the manufacturer of gas. Then the facilities it also afforded to the fraudulent, and the perpetual sudden changing of the valve to and fro, in its opening and collapsing, producing an unsteady flame, created a prejudice against its use, wherever a clear and steady light was required. These imperfections have therefore rendered this meter obsolete.

The next dry meter was introduced by Sullivan; although of a different construction, it was formed upon the same principles, of the same material, and was subject to precisely the same evils as regarded the leather and the unsteadiness. This meter likewise never came into general use.

The only other dry meter, of sufficient importance to be mentioned, is that constructed by Defries. In this instrument, each of the three measuring-chambers of which it is composed is separated from the others by a flexible partition formed of leather, partially defended from the chemical action of the gas by metal plates. This flexible partition is expanded by the pressure of the gas, and in the alternate expansion and contraction it forms a cone. Now, as a cone is one-third part of a cube, one-third part of the surface only is available to the pressure of the gas. Independently of the loss of power thus occasioned, a further loss arises from the sides of the flexible partition being fixed, and the centre only being moveable, and registering by its motion the gas consumed. Further, if where the leather is attached to the sides of the case there be a play of 1-16th of an inch between the plates and the line of attachment of the leather, in the backward and forward motion, it passes through ⅛th of an inch; thus, when by use and exposure to the atmospheric air, the leather has contracted only 1-32nd of an inch, then in its motion it passes through this 1-16th part of an inch, the effect of which is, that the measuring-chamber is diminished by this 1-16th of an inch over the whole diaphragm. Now, since it measures merely a conical space, it must be evident, that this loss of 1-16th of an inch over its surface very much lessens the measuring-chamber.

In cases where the meter has been some time at work, it is stated, that it has thus registered, against the consumer, as much as from 8 to 11 per cent. The reverse of this occurs when the meter has been some time in use, without any admission of air, and then the manufacturer incurs a loss.

Each flexible partition consists of four triangular divisions, each of which is protected by a metal plate, and between each division and all round the outer rim of the partition, where it is attached to the case of the meter, there is necessarily an uncovered surface of the leather, to allow the partition to move freely backwards and forwards, this leather is consequently liable to be acted upon by the gas.

This circumstance must be an objection to every meter in which the flexible material forms part of the measuring diaphragm.

Croll and Richards' meter avoids these objections, which have hitherto prevented the general use of dry meters. The machine will be more readily understood, by immagining a steam-engine measuring its steam, as it really does, in all cases. The steam enters the cylinder, from the boiler, on to the top of the piston, forcing it through a certain space; the supply is cut off, and the action is reversed, the bulk of steam occupying the space through which the piston moves is thus measured; for, presuming the piston to be of a given area, and the distance through which it moves at every stroke to be constant, it can readily be conceived how the actual quantity of steam employed could be indicated or calculated. The meter in question bears a strong resemblance to a double engine. It consists of a cylinder, divided by a plate in the centre into two separate cylindrical compartments, which are closed at the opposite ends by metal discs; these metal discs serve the purpose of pistons, and they are kept in their places by a kind of universal joint adapted to each; the space through which the discs move, and consequently the means of measurement, is governed by metal arms and rods, which space, when once adjusted, cannot vary. To avoid the friction attending a piston working in a cylinder, a band of leather is attached, which acts as a hinge, and folds with the motion of the disc; this band is not instrumental, to any extent, in the measuring, so that if it were to contract or expand, the registering of the meter would not be affected, inasmuch as it would only decrease or increase the capacity of the hinge, the disc still being at liberty to move through the required space; the leather is also distributed in such a manner, being curved, and bending only in one direction, that it prevents any wrinkles or creases from forming, and renders it, therefore, much more durable.

The arrangements of the valves and arms are somewhat different to that of a steam-engine, although similar in principle.

Another advantage of this meter is the small amount of pressure which is required to work it.

This valuable quality can be best appreciated by practical gas manufacturers.

By means of this meter the gas companies possess an accurate measure of the quantities of gas actually consumed by each of their customers, and their inspectors have no longer to contend with the difficulties and the frauds above enumerated.

Mr. Croll explained, that the chief peculiarity of this meter consisted in the disc moving bodily forward, without having any portion of the periphery limited in its action by a hinge. The band of leather, surrounding the disc, might be compared to the packing of the piston of a steam-engine, and any expansion or contraction that might take place could not alter the capacity of the measuring-chamber, or change the distance travelled by the disc. The leather was not liable to crack, as it was not worked backwards and forwards, but was always bent in the same direction. He considered this was an important improvement, as in almost all other dry meters the flexible material acted as the hinge, at the same time that it formed part of the measuring-chamber. He found, practically, that the action of the meter was very steady, and that the measurement was accurate. About eleven hundred of these meters were now in use, although they had only been manufactured for the last nine months.

Mr. Defries said, there were some points of Mr. Croll's paper with which he could not accord, although he perfectly agreed in the statement of the general deficiencies of the wet meters, and the facilities they afforded for fraud. Being aware of the objections against all meters with only two compartments, as being liable to cause oscillations of the lights, he had, in the construction of his meter, adopted three chambers, in order that its action, like that of a three-throw pump, might be continuous. In practice this was found to be the case, and at the Thames Tunnel, the House of Lords, and in many private establishments, where very large meters made by him were used, and their measurements were tested daily, none of the contraction or expansion of the leather hinges, or any alteration in the size of the chambers, had occurred. The leather used was prepared expressly for the purpose, and he believed that the theoretical objections, both to the use of leather hinges and to the form of the chambers, were not well founded; at all events, no ill effects had been found to result from either in a period of seven years, during which time upwards of ten thousand meters had been made. He contended it must be evident, from the form and the arrangement of the chambers of his meter, that it would work correctly under a low pressure; indeed at less, he thought, than if the disc moved bodily forward; but that point could only be ascertained by actual comparative experiments.

Mr. Stevens, had used all the kinds of meters extensively, and he certainly preferred that of Mr. Croll, with whose observations he accorded, relative to the wet meters, and he was of opinion, that it was desirable to obtain a meter that should not be subject to any variation in the dimensions of the chambers, to which, he apprehended, all of them would be, to a certain extent, liable while leather was used for any part.

Mr. J. Farey knew Mr. Clegg's wet meter well, and thought the principle, on which it was constructed, was so perfect that it would be difficult for any dry meter to supersede it, provided the cases of wilful fraud were guarded against. All measuring instruments required care, and he apprehended that the new meter would be, in some degree, liable to the objection of being tampered with, which had been urged against the wet meter. He thought the most serious objection to the wet meter was its liability to freeze, and to become useless in the winter.

The meter, with three chambers, appeared at first sight most likely to keep up an equal flow of gas, and he did not think the dimensions of the chambers would be subject to alter, so as materially to affect the capacity.

The meters with two chambers were somewhat on the principle of the diaphragm pump, patented by Benjamin Martin, nearly a century ago, but which did not succeed in water. The same kind of pump was more extensively used for the 'Carcel' lamps, and in oil it was very durable; but he was of opinion, that when working in dry gas the leather diaphragm would crack, unless it was prepared in a peculiar manner to resist this tendency.

Captain W. S. Moorsom said, that a point of much interest, connected with the subject, was the leakage of the gas through the metal pipes. He understood the same effect had been observed on the atmospheric railway, where the leakage through that portion of the main, which was composed of close pipes, was as great in proportion as in that part with the continuous valve.

Mr. J. T. Cooper said, there could not be any doubt of the porosity of the ordinary metal pipes, so that the process of 'endosmose and exosmose' occurred to a great extent, particularly with soft iron pipes. This subject had been discussed at length last Session. If harder iron, of a greater density, were used, there would be less porosity. He was astonished to hear the statement, relative to the leakage of the air through the metal of the pipes in the main of the atmospheric railway; but with respect to the pipes in the streets, it was not surprising that carburetted hydrogen gas, which was very volatile, should traverse the pores of soft iron.

The method of exhibiting the 'endosmose and exosmose' process, by means of jars, covered with a sheet of India-rubber, and filled with gases of various density, was well known to chemical students.

Mr. Farey believed, that if the gas pipes were made from better materials they would not be so porous as to be in any way prejudicial; but now, for the sake of a low price, they were cast from any sort of coarse bad iron, and they could scarcely be expected to be sound. Much also depended upon the method of casting them. If they were cast in moulds placed vertically, with fountain jets, the thickness of the pipes would be more uniform, and the metal would be less liable to be spungy.

Mr. Lowe, was of opinion, that Mr. Croll had estimated at too low a rate the amount of leakage of gas from the station, the mains, and the service-pipes. He was aware of the difficulty of arriving at a correct estimate of the loss from the different parts of so comprehensive a system as the lighting of a district; but he was anxious to remove any impression of the Gas Companies sanctioning any attempt at incorrect measurement of the gas delivered for consumption; and he thought also, that although some flagrant cases of fraud, on the part of the consumer, had been detected, there was some little exaggeration in Mr. Croll's statement of the extent of such practices. Mr. Low was aware, that in some places extraordinary results were announced. For instance, at Rothesay, Isle of Bute, the engineer said, that he could account for every foot of gas that was made. He did not even allow the loss of 5 per cent. which it was generally admitted, not unfrequently leaked away, by the defective joints of old gasometers. No allowance was made for the condensation in the mains, of the aqueous vapour, and other matter carried over by the gas, and which constantly occurred in all pipes.

Mr. Lowe had made a careful examination of this point in a main of pipes, 18 inches in diameter and nearly a mile in length, which was laid from the Horseferry Road gas station to the Houses of Parliament, for the express purpose of lighting those buildings alone. At first it was observed, by the difference between the meter at the works and that at the House of Lords, that there was a leakage of about 150 feet per hour; there was not any perceptible smell at the surface of the ground, but when the pipes were laid bare, it was discovered that they had been badly laid, and that there were many defective joints. The whole line was repaired, and was apparently perfect, but still there was a certain amount of leakage.

The same had been observed in the independent main from the gas works to the Penitentiary. During the day time when no gas was used, and the pressure was only $\frac{2}{10}$ths inch, just to keep the main filled, the meter on the main at the gas works never stood still, but eventually indicated a certain amount of loss which could only be the result of leakage from the pipes.

Another source of loss was that which arose from the destruction of the wrought-iron service pipes by oxydation under ground. It had been asserted, that in opening the ground in the streets, it was not uncommon to find, that the whole of the metal of the service pipe was gone, and that the gas travelled through a tube of metallic oxyde which had formed a sort of concrete with the gravel in which the tube had been laid. Many kinds of artificial coating had been tried for protecting the service pipes from the action of the damp earth, but Mr. Lowe believed, that hitherto nothing effectual had been discovered. The wrought-iron service pipes would, at present, last from 3 years to 5 years, after which new ones should be laid down. He was convinced, that more than 5 per cent. should be allowed for the leakage of the main alone, independent of all those other sources of loss which he had enumerated.

Mr. Lowe did not think that any of the meters registered with mathematical accuracy the quantity of gas passing through them; but he was of opinion, that if the water line of the wet meter was correctly maintained, that meter, in its actual improved state, was the most accurate. In very hot, or very cold situations, dry meters were essential, as the evaporation of the water, or its freezing, would equally derange its action. The freezing could be obviated by dissolving in the water a little common salt, or some caustic potash (soaper's lees); but the evaporation could not be prevented.

He thought, that when in good order, the dry meters would work under as light a pressure as the wet meters; but there was a possibility of the leather becoming rigid, if they remained any length of time inactive.

The ratio of the amount of the leakage did not appear to follow the same rule, with respect to the diameter of the pipe, as did the quantity of gas passing along pipes of given diameters under given pressures.

Mr. Croll did not think Mr. Lowe's arguments conclusive, against the position assumed in the paper. The case of the

Rothesay gas works had not alone been considered, as many gas works accounted for within 8 per cent. of all that was sent out. The Manchester works had a deficiency of only 3¼ per cent. In a main of very large pipes, extending from the gas works, situated at West Bromwich, to Birmingham, a distance of nearly 7 miles, the amount of leakage was only from 7 to 8 per cent. The gas was sent along the main, under a pressure of about $3\frac{6}{10}$ inches, until it reached Birmingham, which was at about 120 feet higher level than the works at West Bromwich. About 16,000 cubic feet of gas passed through the main per hour.

Mr. Croll exhibited the discs and leather packing of his meter, detached from the case, and explained, that from the manner in which the leather was attached to the discs, whatever expansion or contraction occurred, no alteration could take place in the quantity of gas expelled by each forward motion of the disc; for the packing formed a bag all round, in which a certain quantity of gas lay stagnant, and whether that bulk was greater or less, no difference could be produced in the measurement.

Mr. Farey thought the rigidity of the leather would very probably impede the action of the dry meter, and that the unexpressed gas which remained in the bag, or packing, would probably become more dense, and thus more inequality of measurement would ensue. The wet meter was free from these objections.

Mr. Apsley Pellatt was a considerable consumer of gas, and he must be allowed to give his testimony in favour of the dry meters; he found, that in consequence of inattention to the water line in the wet meter, errors of measurement had repeatedly occurred, and constant annoyance had been experienced from their being frozen in winter; but since he had adopted the dry meter, a saving of nearly 15 per cent. had resulted.

REPORT OF EXPERIMENTS ON GUNPOWDER, MADE AT WASHINGTON ARSENAL, IN 1843 & 1844.

BY CAPTAIN ALFRED MORDECAI, OF THE ORDNANCE DEPARTMENT.

This Report embodies the results of many thousands of accurate experiments made by Capt. Mordecai, under government authority, with instruments constructed in such a manner as to ensure perfect accuracy. Having had the satisfaction of inspecting the instruments, and of hearing from Cap. Mordecai, an account of the methods of experimenting, we can speak of them with the greater certainty. The force of gunpowder, since the time of Hutton and the French experimenters, has been calculated by means of the *balistic pendulum* and of a *gun pendulum*. The *gun* (in these experiments a twenty-four and a thirty-two pounder) is suspended in an iron frame, hung on knife edges of hardened steel, like a balance beam, the whole supported (a load of 10,500 lbs.) on massive stone pillars. The recoil is measured on a limb of brass, having a curve, of which the frame work and the gun are the radius, and graduated to read to seconds by means of a vernier which is moved by the recoil, and retained at the point of greatest vibration by a slight spring. When the gun is adjusted and at rest, its axis is a horizontal line, and the vernier stands at zero on the scale.

At a distance of only fifty-five feet, (between the centres,) is inserted the *pendulum block* for receiving the shot and measuring its velocity. This *pendulum* is a counterpart to the gun, as regards its mode of suspension and motion, which is also measured in like manner on a graduated arc. This "*block*" as it is called, resembles a mortar or wide howitzer, with a bore of four and a half feet deep and fifteen inches calibre, and filled with leathern bags of sand, and a bedding of lead. This block, the frame and counterpoise weights, weighed 9,358 lbs., and was suspended so as to hang when at rest, with its axis perfectly in one and the same line as the axis of the gun. When prepared for use the aperture of the pendulum block was covered by a sheet of lead, which served to make the deviation of the ball from a right line, by the hole which was pierced in it. This deviation was found to be very slight.

It seems, to a person unaccustomed to such experiments, a rather daring attempt to fire a thirty-two pound shot, at the distance of only fifty feet in the mouth of another gun. But that velocity which, left unrestrained, would serve to carry the shot for miles, is in this apparatus restrained within the range of a few feet, and imparts only a moderate motion on the great mass of matter on which it impinges, which can be wholly and accurately estimated. Capt. Mordecai remarks, that "an observer, placed in such a position as to see the face of the block unobscured by the smoke of the gun, perceives, at the moment of impact, a circle of *redish white flame* surrounding the hole made by the ball." He supposes "that this flame may be produced by the combustion of minute particles of iron and lead ignited by friction." He further remarks, that "in firing a thirty-two pound ball into the pendulum block with a charge of eight pounds, the sand immediately before the ball was compressed into a solid mass, forming an imperfect sandstone sufficiently firm to bear handling. A specimen is still preserved in that state, after a lapse of more than eighteen months." This sand, when examined, was found quite free from any calcareous cement. An apparatus of quite similar structure, on a proportionate scale, was used for muskets. In these experiments powder from a great number of manufactories, and of great variety of composition, grain, and finish, were tested. The elements for calculating the strength of gunpowder, obtained by these experiments, were resolved by the formulæ of Hutton and those which more recently have been employed by the French at Metz. This portion of the labor is performed with the accuracy and skill which characterize all the highly educated officers from West Point Academy. Capt. Mordecai concludes from the results of his experiments, that the only reliable mode of proving the strength of gunpowder is to test it, with service charges, in the arms for which it is designed; for which purpose the balistic pendulums are perfectly adapted.

In the twenty-four pounder gun, new cannon powder should give, with a charge of one-fourth the weight of the ball, an initial velocity of not less than sixteen hundred feet, to a ball of medium size and windage.

The initial velocity of the musket ball, of 0·05 in windage, with a charge of one hundred and twenty grains, should be

With new musket powder not less than 1,500 feet.
" " rifle " " " 1,600 "
" fine sporting " " " 1,800 "

The common eprouvettes are of no value as instruments for determinating the relative force of different kinds of gunpowder.

The proportion used in making our best powder, 76.14.10, and the English 75.15.10, appear to be favorable to the strength of powder. The best mode of manufacture is in what is called the cylinder mills under heavy rollers, and this process alone is considered capable of making good sporting powder. The English have employed this process for fifty years, but the French still use the old method, by stamping or pounding. The "*gravimetric density*" should not be less than 850, nor more than 920. The charge for canon for all ordinary purposes should be one-forth. No purpose, even breaching a battery, requires more than one-third the weight of the ball. For small arms the following charges are proposed: for the percussion musket, 110 grains; the percussion rifle, 75 grains; the percussion pistol, 30 grains of rifle powder. It is proposed that musket and rifle balls should be made by compression, instead of casting, as at present. —[*Silliman's Amer. Jour.*]

REPORT OF THE FIFTEENTH EXHIBITION OF AMERICAN MANUFACTURES, HELD IN THE CITY OF PHILADELPHIA, FROM THE 21ST OF OCTOBER TO THE 1ST OF NOVEMBER, 1845,—BY THE FRANKLIN INSTITUTE.

We extract the following, in a condensed form, from the Franklin Journal, to shew the zeal with which our transatlantic brethren are actuated, in improving the skill and exciting the ingenuity of their artizans. In England we have to regret the want of any means, however inadequate, whereby the skill of one class of workmen may be put in juxta position with another, and thus render mutual improvement to all branches of the manufacturing arts. The example shewn, some two years since, at Paris, and the general interest then created by the *Exposition*, was thought likely, by many persons, to stimulate manufactures in this country to an honorable rivalry; but, excepting the exhibition of last year in London, brought forward merely for a political purpose, we have, as yet, had no displays of industry but those connected with agricultural pursuits. To foreigners it is a matter of general surprise that the English artizan knows nothing unconnected with his particular branch; but when it is explained that he has no opportunity of seeing other work than, perhaps, his own, such general ignorance is at once accounted for; and it is then apparent, that skill in workmanship has only been attained by the sacrifice of ingenuity,—the ability of the fingers has been developed at the expense of the head.

It is pleasing to turn from this state of things to the very different system pursued in the United States, for, by the following report, it will be found, that even "perfumery" and "artificial flowers" have not escaped the notice of the Franklin Society.

REPORT OF THE COMMITTEE ON EXHIBITIONS.

In presenting their report on the fifteenth exhibition of American manufactures, held under the direction of the Franklin Institute, the committee on exhibitions feel that they have renewed cause for congratulating the friends of American industry upon the result. They are truly gratified, on this occasion, to notice the steady march of improvement in almost every branch of our home productions. The skilful and persevering efforts of our manufacturers, mechanics, and artisans have been crowned with such success as promises very shortly to render us independent of foreign workshops, for almost every article made for purposes of utility, convenience, or luxury.

The principal object of the Institute in holding these exhibitions is, to enlarge and continue the impulse already given to improvement in the arts and manufactures; the evidence of which is presented, from year to year, in the great number of newly invented or improved articles, and in fabrics of finer finish and lower prices, produced by the application of new machinery or improved processes.

Industry is the true source of wealth. Capital, judiciously employed in manufacturing, creates wealth, by encouraging industry and enterprise; and when money is thus invested, with a view to the employment of labour, this very labour creates additional wealth. No one need then be idle, and the mechanic and the labourer, with ordinary prudence, may enjoy not only the necessaries, but many of the luxuries of life. By the increase of manufacturing establishments, employment is not only afforded to men and women, but a sure means is offered of training youth to industry, and keeping them from idleness, mischief, and vice. Many parts of New England present pleasing examples of the comfort, morality, and order, as well as the decency of appearance and manners, which may exist among a well-regulated and intelligent manufacturing community,—the more pleasing when contrasted with the vicious habits and turbulent disposition manifested by the idle and dissolute portion of the population of some of our large cities.

If, therefore, our capitalists, instead of dabbling in stocks and encouraging wild or useless projects of speculation, would invest their money so as to encourage labour, they would not only insure a profitable return, but would likewise enjoy the high satisfaction of promoting the real prosperity of our country, by encouraging and adding to its productive industry, by giving employment to, and producing a better state of morals and conduct among a class of society where idleness is sure to produce mischief and crime.

In the arrangement of the exhibition, the committee endeavoured to pursue such a course as they judged best calculated to ensure general satisfaction, and to afford the depositors the best opportunity of a favourable location, according to the kind of articles exhibited. Yet so extensive was the collection, that, notwithstanding the immense size of the rooms on both floors of the museum building, including the galleries, sufficient space was scarcely afforded. Almost every department of productive industry was represented. The manufactures of metal, from a steam-engine down to a watch spring and a needle, were there; so also were the fabrics of the loom, the factory, the workshop, and the laboratory; cottons, woollens, silks, glass, leather, paper, and the thousand useful preparations and modifications which art and skill produce from rough material or unconverted masses. This vast variety of useful and ornamental articles, the fruits of skill, genius, and invention, were generally of a quality and workmanship honourable to the producers, and creditable to the mechanics of our country.

In the award of premiums, it has been the desire of the committee to adhere strictly to the rules prescribed. They are fully aware that the closest scrutiny and the most rigid impartiality are necessary in the department of their duties, and that even these will not give satisfaction to all. Disappointment will be felt, and offence taken, whatever diligence may have been used to avoid all occasion for either, and however justly and impartially the awards may have been made. In a collection of such immense extent, and comprising so vast a variety of objects, it is scarcely possible that some should not be overlooked, or otherwise fail to receive the requisite attention.

Competent and disinterested persons were selected as judges on each separate class of goods deposited, from whose reports the following detailed abstract of awards, observations, and notices is chiefly compiled:

I.—COTTON GOODS.

The committee of judges on cotton goods, in their report, state, that they have been guided solely by their desire to do justice to all parties, and to further, as far as in them lay, the progress of the industrial arts in the extension of the manufacture of the many articles of daily use to which their attention has been directed. Believing, as they do, that the prosperity of our whole country depends, to a very great extent, on the employment and increase of *home labour* in the production of the various commodities of taste, as well as of necessity, that make up the larger amount of the business transactions of the country, they are always gratified at any exhibition of American skill tending to this result.

They regret that the exhibition of the present season does not offer a greater variety of articles for competition, which they can scarcely account for, but by the supposition that a disinclination exists among many manufacturers to make too public their improvements in design, or their novelties in invention; fearing, perhaps, that a too early publication of them might interfere with that full compensation for their skill and enterprise to which they, no doubt, feel themselves entitled. Another reason may, perhaps, be found in the fact that the manufacture of a large portion of the cotton fabrics of the country is in an unusually flourishing condition, allowing little time to any thing but the pressing demands of the business. The committee hope that the future exhibitions of this branch of American industry will be more commensurate with its importance than they have hitherto been.

II.—WOOLLEN GOODS.

The display of woollens, from its extent, variety of style, and general excellence, is highly interesting, shewing the rapid progress of our enterprising manufacturers in this important branch of our home industry. American citizens need be no longer dependent upon foreign looms for suits of elegant and substantial clothing.

III.—CARPETS AND OIL CLOTHS.

The assortment of goods deposited in this department of the exhibition was not extensive, and might be greatly increased by our manufacturers. The samples exhibited were generally good, and creditable to the makers.

IV.—SILK GOODS.

The silks exhibited were very good, and fully sustained the previously acquired reputation of our American silk manufacture.

V.—IRON AND STEEL.

This staple production of our own state was creditably represented in the exhibition, and was carefully examined by competent and skilful judges.

VI.—UMBRELLAS, &c.

The display of articles in this line was rather limited, but are all spoken of by the judges as being worthy of commendation.

VII.—LAMPS AND GAS FIXTURES.

The judges appointed to examine this branch of the exhibition report that the display of lamps is not so extensive as on some previous occasions, but the former general character of excellence is fully sustained.

VIII.—HARDWARE AND CUTLERY.

The extensive assortment of useful and ornamental articles in this department added much interest to the exhibition, and from their general excellence reflect much credit upon the makers. It is proper to observe that most of the articles exhibited were taken from the shelves of the manufacturers, or their agents; indeed the committee are not aware of a single specimen having been made expressly for the exhibition. The very high degree of perfection to which this branch of industry has attained among us is highly creditable to American skill. Most of the articles exhibited will compare advantageously with the same description of goods of the best European make. Nothing is wanting to establish this branch of industry on a firm basis, but the patronage of a discriminating public.

IX.—SADDLERY, HARNESS, AND TRUNKS.

The articles in this department, though possessing no marked superiority over those of former exhibitions, were generally well made, and reflected credit upon the manufacturers.

X.—MODELS AND MACHINERY.

Although this department contained a great number of articles, many of which were ingenious, useful, and meritorious, the committee have again to express their regret that this flourishing branch of the mechanic arts was not more fully represented. In order to enable moving machinery to be favourably, exhibited motive power was provided at considerable expense; but it was employed by comparatively few depositors. The display of working machinery adds greatly to the attractive interest of an exhibition, and would also, as it seems to the committee, be much to the advantage of those who have new or interesting machines, with whose performance they desire to make the public acquainted.

XI.—STOVES AND GRATES.

The spirited competition which exists among our enterprising stove manufacturers generally secures a full display in this branch of the exhibition. New forms and ingenious devices for improvement appear at each succeeding season, and in the great variety deposited in our lower saloon ample opportunity is afforded the public to choose according to taste, convenience, or fancy. The judges appointed to examine this department express their satisfaction with the variety and general convenience of the articles brought under their notice.

XII.—CABINET WARE.

Many articles of furniture in this division are distinguished for taste in design, ingenuity of construction, and excellence of workmanship, reflecting great credit upon the makers.

XIII.—MUSICAL INSTRUMENTS.

The judges selected to examine and report upon musical instruments, after careful examination of those deposited, remark that they are fully aware of the difficulty in making improvements in pianos, and regret that among the great number exhibited (though equal to those in former exhibitions, and creditable to the manufacturers,) none are found presenting any superior qualities to those of late years. Nicety of mechanism in the keys, roundness, purity, and evenness of tone, are the great desiderata in this instrument. A majority of the judges disapprove of the Æolian attachments to pianofortes, and likewise the introduction of harmonic pedals. They are strengthened in this opinion by the experience and practice of the great masters of Europe, who discountenance all these so-called improvements, as detracting from the legitimate character of the instrument, and rendering its use too complicated.

XIV.—GLASS, CHINA, &c.

The display of articles in this department is in a high degree creditable to the manufacturers, and shews the rapid advance of improvement in this interesting branch of our home industry.

XV.—BOOKS AND STATIONERY.

The articles deposited in this line shew little improvement over those of former exhibitions. It is suggested by the judges, that in future the binders should offer for premiums volumes in plain sheep, for medical and library use, and also volumes in muslin for schools, and other works; having reference to strength and fixedness of the volume in the case, as well as neatness of finish and gilding. Printers might also submit specimens of book-work from machine and hand-presses, so as to exhibit the improvements in types and the work of printing offices.

Great improvements have been and continue to be made in the machinery connected with paper making, as well as the application of chemical principles to the art; the result is a handsomer and better paper from inferior stock. It is suggested that competition be offered for printing paper, particularly a kind for every-day sale at 12½ cts. per lb.

XVI.—PAPER HANGINGS.

But little competition appeared in this department.

XVII.—FINE ARTS.

The display in this branch of the exhibition is inferior, with a few exceptions, to any offered for several years. This may probably be owing to the opening of the exhibition of the Artists' Fund Society and Academy of the Fine Arts at the same time.

XVIII.—SILVER WARE AND JEWELLERY.

The number of articles deposited in this department is comparatively small, and the committee have to express their regret that the manufacturers in this interesting and attractive branch have generally neglected to avail themselves of the opportunity thus afforded them to shew their work, and enter into competition for the honors of the Institute.

XIX.—BOOKBINDERS' WORK AND TOOLS.

The assortment of articles deposited under this head is very limited, but of considerable merit.

XX.—MARBLE WORK.

Notwithstanding the large amount of excellent marble work done in this city and its vicinity, our collection is small.

XXI.—HATS AND CAPS.

This branch of domestic industry is generally well represented in our exhibitions, and this year, owing to the emulation existing among our enterprising hatters, the display is superior to any shewn on former occasions. The improvement in manufacture is such that competition from abroad is scarcely thought of. English hats, formerly plentiful, are now seldom seen, and the Paris silk hats are only worn because they come from Paris, and not from any superiority they possess over those made in this country.

The judges appointed to examine this department say that there are hats in the present exhibition so perfect that they are at a loss to conceive in what particular they are susceptible of improvement, combining, as they do, all the excellences of quality, color, finish, and trimming.

XXII.—COMBS AND BRUSHES.

The assortment deposited is not large, and the judges express their regret that there seems to be so little disposition to enter into competition in this line. Some of the paint and other brushes are very well made; but nothing being exhibited which shews improvement over former displays, no awards have been made.

XXIII.—COACH WORK.

In accordance with the report of the judges selected to examine this department, the committee have made several awards.

XXIV.—LEATHER AND MOROCCO.

In variety and quantity this important branch of our home manufactures was fairly represented. Careful and skilful judges were selected, who, after diligent examination, recommended awards.

XXV.—BOOTS AND SHOES.

This department of the exhibition is creditable to the depositors, on account of the quality and style of the goods, though a greater variety of ladies' shoes would have been desirable.

The judges appointed to examine this branch remark, that although they admit and admire the adaptation of skill in this department of the mechanic arts to suit the varying mode of fashion, yet they discover the development of no new principle, by the advancement of which former competitors are eclipsed, or superior advantage derived to the public.

XXVI.—CHEMICALS.

In this interesting department the display was excellent, and the articles generally such as to reflect credit upon our operative chemists as manufacturers, although no very marked improvement is noticed over those in the last exhibition.

SOAPS AND PERFUMERY.

The great display of these articles excited much attention, and added in no small degree to the interest and general effect of the exhibition.

XXVII.—PHILOSOPHICAL APPARATUS.

The number of instruments constructed for scientific purposes, and deposited in this department of the exhibition was large; and it is truly gratifying to be enabled to remark that they were generally of a character to reflect great credit on the makers.

XXVIII.—STRAW GOODS.

But few articles in this line have been deposited. The judges consider those in the present exhibition as fair and creditable samples; but perceive nothing superior to those of the same class shewn on former occasions.

XXIX.—SURGICAL INSTRUMENTS.

The articles deposited under this class have been carefully examined by competent judges, and premiums awarded.

XXX.—INDIA-RUBBER GOODS.

The exhibition of India-rubber or gum-elastic goods is inferior in several respects to the display of articles of this kind on previous occasions.

XXXI.—COPPER, BRASS, AND PLUMBERS' WORK.

Awards and approving notices were given, in accordance with the report of the judges who examined the articles deposited under this head.

XXXII.—TIN WORK.

Though the deposits in this line were not extensive, yet they contained many beautiful and highly-finished articles; and the judges remark that they are much gratified to discover a decided improvement in the manufacture. It is a matter of regret to the committee, that among our numerous and skilful tin-plate workers so few seem inclined to enter into competition in this branch.

XXXIII.—PAINTS AND COLOURS.

The articles deposited under this head were examined and tested by the judges appointed for that purpose, who characterize them generally as good and fair specimens.

XXXIV.—FANCY ARTICLES.

This department is, as usual, very large, comprising a vast variety of articles of very different grades of merit, from the most beautiful specimens of taste, skill, and ingenuity, down to very ordinary and trifling specimens. It contains, indeed, a number of articles which should not have been admitted to the exhibition, inasmuch as they reflect no particular credit upon the general display, or upon their makers. The judges, after careful examination, recommend awards.

XXXV.—HOUSEHOLD ARTICLES.

In this department, comprising a vast variety of articles of domestic utility, the display was respectable, and creditable to the depositors. In conformity with the report of the judges who examined this division, awards were made.

XXXVI.—CLOTHING AND NEEDLEWORK.

In this division of the exhibition, the judges feeling that they needed the aid of feminine taste and judgment, are happy to acknowledge the efficient service of a committee of ladies, who very diligently and carefully examined a large assortment of articles in this department. A very sensible and well-written report was received from that committee, and the judges, relying on the superior knowledge possessed by these ladies with regard to most of the articles enumerated, have been guided, in a great measure, by their report.

CONCLUSION.

And now, in closing their arduous duties for the present year, the committee would remark, that having conferred on articles which they deemed the most deserving, the number of *fifty-one* first premiums,—on those of the next grade *fifty-two* second premiums,—and those of a lesser degree of merit, *one hundred and thirteen* third premiums; and having also noticed as worthy of credit and approbation such other articles as they conceived worthy of such mention, they return their thanks to the depositors and to the public for the interest manifested in the exhibition. It has been computed that, including members of the Institute, depositors, and ladies and minors introduced by them, not less than *seventy thousand* persons visited the rooms during the eleven days they continued open. This degree of attention and public favour is honourable to the Institute, and will be felt and regarded as a renewed stimulus to exertion in accomplishing the great object of its charter, "the promotion of the mechanic arts."—[*Journal of the Franklin Institute.*]

ON THE PRESERVATION OF WOODEN RAILWAY SLEEPERS.

BY M. BOUCHERIE.

[*Translated for this Work from the Bulletin de la Société d'Encouragement.*]

My attention has been given to the improvements which might be effected in the properties or qualities of different kinds of wood by impregnating them with various matters, and I have observed and noted down facts of very great importance concerning their incombustibility, hardness, flexibility, and colour. I am now desirous of directing attention to an important result connected with the economy of railways, viz., that woods of an inferior quality may be used for the sleepers which support the rails.

As far back as the year 1838, I was fully aware of the importance of preserving wood buried in the earth; and in order to arrive at a correct idea of the preserving properties of various substances, and their cost, I made experiments upon a thousand young chesnut and pine stems, of about the dimensions usually employed for propping vines. These were divided into eleven series of equal number; one of these series was left in the natural state, and the ten others were each impregnated, by suction, with a different saline solution, care being taken to vary the degree of concentration in each series. The compositions used were bichloride of sodium and mercury, salts of iron, copper, zinc and lead, chloride of sodium, chloride of calcium, mixtures of chloride of sodium with soluble metallic sulphates, mixtures of chloride of calcium with certain pyrolignites, and lastly, raw pyroligneous acid.

After having been prepared, and carefully ticketed, the whole were buried in the earth to the depth of about one foot, and left there for two years and a half; upon being examined after that time, very interesting and unexpected results were observed, and which will, at a future period, form the subjects of a special communication.

At present I shall confine myself to the statement of the fact that the unprepared pieces of wood, and also those impregnated with the salts of lead, were found to be worm-eaten throughout the whole of that portion buried in the earth, and so rotten that they could be broken with a slight touch. Those prepared with the salts of iron were also considerably deteriorated, whilst the eight other series were not in the least affected. Several experiments proved to me that they had preserved all the properties of new wood of the same kind.

Relying upon these results, and believing myself warranted in judging of older woods, I concluded that the fact was now established beyond a doubt, of the possibility of greatly increasing the durability of railway sleepers. I therefore boldly presented myself to a company, and offered to prepare part of their sleepers, but, to my great surprise, my opinions were rejected; the first objection which met me was, that the wood upon which the experiments had been tried was not the kind of wood required for the manufacture of sleepers; and it was further objected, that in a question of such importance no conclusions would be acted upon unless arrived at in the most direct manner; meaning thereby, that they would not accept as a fact proved beyond dispute, the long duration of prepared oak, until blocks of that wood of the length and diameter of the sleepers had been buried in the earth after preparation, and left there some time.

These observations appeared to me to be very just, and I felt that I could only oppose them successfully by going again through a series of experiments which would last several years. This I undertook without hesitation, taking advantage of the favourable position in which I was placed by the Minister of Marine, who sent me to prepare wood in the forest of Compiègne, where, in November, 1842, I caused 100 blocks of various kinds of wood (beech, elm, birch, alder, and outside oak,) to be cut in lengths of about 8 feet, and varying in diameter from 9 inches to a foot. Some of these blocks were left in their natural state, a larger number were completely impregnated with the preserving liquors above mentioned, and ten blocks received the solutions throughout one half of their length only.

The operation having been thus finished, the whole of the blocks were buried in the earth, in a place enclosed by walls, in the presence of the Inspector of the forest and several of his agents, and also an officer belonging to the marine department, who had been sent with me by the minister. A certificate was drawn up of the time at which the experiment was made, and the nature of the wood: two copies of this certificate were made, one being sent to the private government office, and the other remaining in the hands of the inspector of the forest.

After waiting three years, in the month of November, 1845, I proceeded to dig up and examine the blocks of wood in the presence of the parties who signed the certificate, and also of the Mayor of Compiègne, the chief engineer of the navigation of the Oise, the engineer in ordinary, and several other persons. The following were the results:

1st—The unprepared blocks, of all the different kinds of wood, were in such a state of decay that they were easily penetrated by any soft substance throughout their whole length.

2ndly—The blocks completely impregnated were in a state of perfect preservation, and were stated, by the parties present, to be apparently improved by being buried.

3rdly—The blocks prepared throughout one half of their length only were those which offered the most conclusive results. In fact, the two halves of each block (although, when buried, the wood was the same throughout) presented a remarkable difference. The prepared half was as firm and solid as new wood of the best quality, while the unprepared half was covered with mould, and could easily be reduced to powder.

It appears to me that the importance and bearing of these results will be readily appreciated;—they evidently prove that by preparing beech, elm, birch, alder, and outside oak, sleepers may be made as durable as those made from the heart of oak. It is even probable that the prepared sleepers will last longer than those made from oak; for the best oak, after remaining three years in the ground, undergoes a material change, whilst the prepared sleepers appear in as good a condition as the best new wood.

With regard to the advantages which would result from the employment of my processes, to prove them I have only to state that the cost of preparation is about 3*s*. 6*d*. per cubic yard, and that the cost of oak is about 30*s*. per cubic yard, whilst that of the other woods upon which my experiments were made does not exceed 16*s*. per cubic yard.

Scientific Adjudication.

COURT OF COMMON PLEAS.

(Sittings at Nisi Prius, before Mr. Justice Coltman and a Special Jury.)
Tuesday, February 10th, 1846.

GAMBLE *v*. KURTZ.

THIS was an action brought by the plaintiff, a manufacturing chemist, at St. Helen's, in Lancashire, to recover from the defendant (who is also a manufacturer at the same place) compensation in damages for the infringement of a patent.

Mr. Serjeant Channell, Mr. Serjeant Byles, and Mr. Cowling, were counsel for the plaintiff; Mr. M. D. Hill, Mr. Atherton, and Mr. Webster, appeared for the defendant.

The plaintiff claimed to be the inventor of a new apparatus for decomposing common salt in the manufacture of muriatic acid, sulphate of soda, chlorine, and chlorides; which apparatus the plaintiff had secured by patent in the year 1839. The alleged improvements upon the principle formerly employed for similar purposes consisted in the adoption of two iron retorts or furnaces, the one for decomposing and the other for roasting, instead of brick furnaces. By the plaintiff's contrivance, the salt was decomposed in one compartment, and roasted in another, whereas, by the method heretofore adopted, these processes were not two distinct operations. It appeared from the evidence of the plaintiff's witnesses, that previously to the plaintiff's invention there had been in existence other descriptions of apparatus for manufacturing these articles, one being "egg-shaped pots and iron cylinders;" another, an apparatus with a "reverberatory furnace;" and, lastly, one called "Lutwyche's patent." The peculiarities of these several modes of manufacture were minutely described by the aid of models.

The plaintiff's apparatus was composed of three compartments, each made of iron, and set in brickwork. The two outer compartments were called "decomposing retorts," and the centre one was termed "a roasting" or "finishing furnace." Between each of these compartments there was a connexion, by means of a small aperture. Into either of the end retorts common salt was put, through a small opening in the side. Through the same aperture sulphuric acid was admitted, and brought into contact with the salt, which, under a temperature of 300° produced a decomposition of the salt. The produce was then pushed, by means of a rake, through the aperture into the centre or roasting furnace, and there submitted to an increased degree of temperature, by which means the muriatic acid became evolved as gas, and the deposit remaining assumed the character of sulphate of soda. The muriatic acid gas was then conveyed, by means of pipes, into three cisterns, filled with water and small pebbles, and there became condensed and absorbed by the water, and formed muriatic acid. It was proved by the witnesses that large quantities of these manufactures were used for commercial purposes; and also that the defendant's apparatus, a model of which was produced, was substantially the same as the plaintiff's; the roasting furnace, however, being composed of brick instead of iron. The plaintiff rested his claim on the combination of the different parts of the apparatus, and not upon any novelty in any particular part.

The defendant had pleaded eight pleas, which in substance were—that he was not guilty—that the plaintiff was not the inventor of the apparatus in question—that the invention, if new, was not properly described in the specification—and that the use of the plaintiff's apparatus was no improvement in the manufacture of sulphate of soda.

The witnesses who were called on the part of the plaintiff to prove the superiority of his invention over the method formerly employed for the decomposition of common salt in the manufacture of sulphate of soda, &c., consisted chiefly of eminent practical chemists, and their examination occupied the Court the whole of Saturday.

The plaintiff's case having closed on Monday morning—

Mr. Hill submitted to the court that the plaintiff must be nonsuited on the following grounds;—1st. That the defendant had not been guilty of an infringement, inasmuch as the plaintiff claimed to be the inventor of iron retorts or furnaces connected together, whereas the defendant's method of producing sulphate of soda was by the use of iron and brick furnaces. 2d. That the plaintiff had described, in his specification, three furnaces, and it was proved that one of them might be dispensed with. 3d. That the iron furnace for roasting was not an improvement in the manufacture of sulphate of soda.

Mr. Serjeant Channell contended that neither of these objections presented any ground for a nonsuit. As to the argument that the plea of "not guilty" had been made out, because the plaintiff had not proved that in the process adopted by the defendant the roasting furnace was of iron, as well as the decomposing furnace, he (Mr. Serjeant Channell) contended that it was not necessary to prove that the whole of the patent had been infringed. It was sufficient to show that the defendant had profited by a part only of the invention claimed. In answer to the second objection—that the specification was bad, because the plaintiff had claimed three furnaces, whereas two only were used—he would remind the court that the claim was for the use of iron retorts connected together; and he submitted that, although three furnaces were described, it was not material to prove that they were all used. Then, as to the argument that an iron furnace for roasting was not an improvement in the manufacture of sulphate of soda, he (the learned counsel) contended that this objection did not arise upon the specification.

The plaintiff had not stated that iron retorts were an improvement upon brick; but he claimed the exclusive use of iron retorts instead of the brick furnaces *heretofore employed* in the decomposition of common salt, and for its conversion into sulphate of soda. The question was, whether the plaintiff's combination of iron retorts was an improvement upon the apparatus formerly in use.

Mr. Serjeant Byles and Mr. Cowling having followed on the same side—

Mr. Justice Coltman decided that the grounds suggested were not sufficient to warrant him in entering a nonsuit. There might be an infringement of the patent by the borrowing of a portion, though not the whole, of the invention; and it would be for the jury to decide whether or not the defendant had borrowed any part of the plaintiff's apparatus. With regard to the objection raised by Mr. Hill, that the iron furnace for roasting was not an improvement—this also would be a question for the consideration of the jury. In reference to the other objection—that the number of furnaces was not correctly described in the specification, it did not appear to him (the learned Judge) that three furnaces were necessarily *claimed* as part of the invention. The description in the specification was sufficient, provided it was not calculated to mislead a workman of ordinary understanding.

Mr. Hill asked his Lordship whether there was not sufficient ground for reserving the question, which arose upon the plea of "Not Guilty," for the decision of the court above.

The learned Judge said, that, supposing the jury should find their verdict for the plaintiff, the defendant should have leave to move for a verdict, upon the plea of not guilty,—the question involved in that plea being whether the defendant had infringed the patent, although he had used one furnace of brick and the other of iron, and not two iron furnaces.

Mr. Hill then addressed the jury for the defendant, and called Dr. Lyon Playfair, and other eminent chemists, to prove that the use of an iron furnace for roasting was not an improvement, inasmuch as the sulphate of soda produced by such means would contain a certain portion of iron, which was decidedly objectionable.

Mr. Serjeant Channell having replied, the learned Judge summed up the case, leaving the jury to decide four questions—whether there had been any actual infringement of the plaintiff's patent; whether the apparatus claimed by the plaintiff was a new invention; whether it was so described in the specification that a person of ordinary understanding could comprehend it; and, lastly, whether the invention was or was not an improvement in the manufacture of sulphate of soda.

The jury retired at twenty minutes to two, and returned into court at six o'clock, delivering the following special verdict:—"That assuming the models laid before the court to be correct, we find that the plaintiff's patent has been infringed; secondly, that the invention of two separate chambers or furnaces is not new, but that the plaintiff's mode of connecting the same is new; thirdly, that the specification is sufficient; and, fourthly, that the process patented is an improvement upon the old system of producing sulphate of soda."

Mr. Serjeant Channell said he feared that, in consequence of this verdict, the three days occupied in the trial of this cause would prove an entire loss both to the plaintiff and defendant.

COURT OF COMMON PLEAS.

TUESDAY, FEB. 24, 1846,

Before Mr. Justice Cresswell and a Special Jury.

CROSKILL *v.* TUXFORD AND OTHERS.

THIS was an action brought for the infringement of a patent granted to the plaintiff on the 8th September, 1841, for improvements in machinery for rolling and crushing land, and in machinery to be used in the culture of grass land.

Mr. Crowder, Mr. Martin, and Mr. Unthank, appeared for the plaintiff; Mr. Serjeant Channell, Mr. Serjeant Byles, and Mr. Serjeant Clarke, for the defendants.

The plaintiff is a machine-maker, residing at Beverley, in Yorkshire; and the defendants are also machine-makers, and reside at Boston, in Lincolnshire.

It appears, that the operation of clod-crushing and consolidating land had formerly been done by a smooth roller, which, on being turned at each end of the field, was found to drag, and afterwards tear up the land; and required great force to turn it. An improvement was afterwards made on this roller by dividing it into two discs, so that, on being turned round, the centre of the roller acted as a pivot, and one disk moved round one way and the other the reverse; thus greatly facilitating the turning of the roller. There were also other machines or circular harrows, which tore and crushed the earth, but did not consolidate it. The plaintiff thought that a decided improvement might be made on these inventions, and he constructed a roller, of a number of separate wheels or discs, all running freely on the same axle; the circumference of each wheel having serrated teeth like a saw, and lateral teeth, not on a radial line, but forming an angle with its axis. The combination, and not the separate parts of this machine, was what the plaintiff claimed. Several scientific witnesses were called, who stated that, in rolling land, the machine had the most perfect action,—produced a degree of equal consolidation of earth, owing to the individual revolution of each disc; and, in turning, had no injurious operation whatever; in which respects it was novel, and a decided improvement on all the former instruments. The machine constructed by the defendants differed from the plaintiff's in the omission of lateral teeth, and in having five of the discs at each end united together, and in the centre two pieces, similarly united, of six discs each; there was also a slight difference in the formation of the teeth. This, the evidence for the plaintiff went to shew, was a substantial infringement of the patent in question, and much less efficient in its operation.

For the defendants several witnesses were called to shew that, before the plaintiff's invention, the principle of dividing the roller into two or more discs, to facilitate turning in the field, was known, and published in an agricultural journal before the date of the plaintiff's patent,—that the number of discs could make no difference in the principle, and that the principle of crushing or consolidating with a roller was also known before the plaintiff's patent. A machine, known as Mayfield's, had its roller composed, first of a wooden cylinder, placed within a loosely-fitting metal case; the external surface of which presented a number of pyramidal teeth. It was contended also that the teeth of the defendants' machine being pyramidal they were not an infringement on those of the plaintiff, which were serrated, and acted as a saw.

Mr. Justice Cresswell, in summing up, said the main question was, whether the defendants had imitated some portion of the plaintiff's machine, which was new. It was not necessary that it should have been copied exactly, it was enough if, by acting on the same principle, the defendants obtained some portion of the benefit which accrued to the plaintiff from his new patented invention.

The jury, after an absence of two hours, found a general verdict for the plaintiff—that the defendants had imitated part of the plaintiff's machine; that the part imitated was new; and that the part imitated was not substantially described in the publication alluded to.—Damages, 40s.

LIST OF REGISTRATIONS EFFECTED UNDER THE ACT FOR PROTECTING NEW AND ORIGINAL DESIGNS FOR ARTICLES OF UTILITY.

1846.

Jan. 29. *George Macfarlane*, of Gerrard-street, Soho, for an improved valve for cornopeans, cornet-à-pistons, trumpets, trombones, &c.

31. *James Kite*, of New North-road, Hoxton, for the diamond deflector.

Feb. 4. *James Abbott*, of Brookhouse, Blackburn, for a window blind distending pulley.

5. *William Henry Barlow*, of Derby, for a design for the shape or configuration of part of a railway chair, for receiving the ends of two rails.

5. *C. Rickson*, M. A., clerk, & *Joseph Morgan*, machine maker, of Manchester, for a conical inkstand.

6. *Charles Pearce*, of Gresham-street, late Maiden Lane, city of London, for a shirt front.

6. *George Fry*, of Lee Park, county of Kent, for the West Kent flower pot.

7. *Alfred Toy*, of 28, Leicester-square, London, for a combined day and night signal apparatus for railways, &c.

10. *William Greaves*, of Banbury, county of Oxford, ironmonger, and *William Hunt Jones*, of New-street, Covent Garden, carpenter, for a mangle.

Feb. 12. *Radford & Son*, of Birmingham, for the imperial parasol sliding joint.

13. *Samuel Messenger*, of Birmingham, for a lens case and fastening for railway lamps.

14. *James Parkes & Son*, of Birmingham, for a measuring tape case as a pocket-book, with leaves for memoranda.

18. *Welch & Margetson*, of 134, Cheapside, London, for a united collar and stock.

20. *Peyton & Harlow*, of 12, Panton-square, for an improved form of metallic side and end rails for bedsteads.

21. *Thomas Atkins*, of Oxford, gas engineer, for "The equilibrium window sash."

24. *Joseph Wood*, of York, surgical instrument manufacturer, for Dr. Torbock's apparatus for the treatment of fractures of the leg.

24. *Peter Arkell*, of Stockwell-place, Stockwell, Surrey, for a gun.

25. *William Field*, of Oxford-street, veterinary surgeon, for a universal safety horse-shoe.

List of Patents

Granted for SCOTLAND, subsequent to January 22nd, 1846.

To John Walker, of Manchester, silk manufacturer, for certain improvements in weaving or manufacturing piled cloths or fabrics; and also improvements in machinery or apparatus for cutting the pile or nap of the same.—Sealed 26th January.

Thomas Worsdell, junior, of Brighton, railway-carriage builder, for certain improvements in apparatus to be attached to, and employed in connection with, railway carriages—Sealed 27th January.

John Depledge, of the Thorncliffe Iron Works, near Sheffield, draughtsman, for a new metallic broacher.—Sealed 29th January.

William Henry James, of Fish-street-hill, London, civil engineer, for certain improvements in tubes, tubular plates, and other vessels and vehicles, used for holding or conveying fluids, and in the means of heating the same.—Sealed 3rd February.

John Greenwood, of Church, in the county of Lancaster, manufacturing chemist, for certain improvements in dyeing Turkey red and other colors.—Sealed 5th February.

John Hopkins, of Woolwich, Kent, surveyor, for certain improvements in railways and trams, for railways and tramways.—Sealed 6th February.

Josiah Marshall Heath, of Winchester-buidings, London, ironmaster, for improvements in the manufacture of cast-steel.—Sealed 10th February.

Peter Taylor, of Hollinwood, near Manchester, machinist, for certain improvements in machinery, parts of which improvements are applicable to drawing and propelling fluids; also improvements in the construction of vessels.—Sealed 12th February.

Josùe Heilmann, of Mulhausen, in the Department on Haut Rhine, in the kingdom of France, machine-maker, for improvements in certain machines used for preparing to be spun cotton, wool, and other fibrous materials.—Sealed 12th February.

George Hinton Bovill, of Millwall, in the county of Middlesex, engineer, for improvements in the manufacture of iron.—Sealed 16th February.

Charles Tetley, of Bradford, stock and share-broker, for certain improvements in the means of raising and impelling water and other liquids, and also thereby to obtain mechanical power.—Sealed 17th February.

William Newton, of the Office for Patents, 66, Chancery-lane, London, civil engineer, for certain improvements in manufacturing piled fabrics,—being a foreign communication.—Sealed 17th February.

John Finlay, of Glasgow, ironmonger, for a certain improvement or certain improvements in raising and lowering gas and other lamps, lustres, and chandeliers.—Sealed 18th February.

William Eccles and Henry Brierley, both of the township of Walton-le-Dale, in the parish of Blackburn, in the county of Lancaster, for improvements in the machinery or apparatus used in spinning.—Sealed 18th February.

New Patents
SEALED IN ENGLAND.
1846.

To George Frederick Hall, of Norfolk-street, Fitzroy-square, Middlesex, pawnbroker, for certain machinery or apparatus for writing and booking, numbering, cutting, checking, and expediting the delivery and receipt of pawnbrokers' duplicates, pass tickets, and other like documents. Sealed 29th January—6 months for inrolment.

James Brown, of Ball's-Row-Hill-field, in the city of Coventry, for certain improvements in weaving. Sealed 29th January—6 months for inrolment.

Augustus Turk Forder, of Leamington Priors, in the county of Warwick, solicitor, for an improved pump or engine for raising and impelling inelastic fluids, and producing motive power. Sealed 29th January—6 months for inrolment.

Charles Cowan, of Valley-Field Mills, in the county of Edinburgh, paper manufacturer, for improvements in the manufacture of paper, mill-board, and other similar substances. Sealed 29th January—6 months for inrolment.

John Greenwood, of Church, in the county of Lancaster, manufacturing chemist, for certain improvements in dyeing Turkey red and other colors,—being a communication. Sealed 29th January—6 months for inrolment.

George Howell, of Larkhall-lane, Clapham Common, in the county of Surrey, for coating with a metal the surface of articles formed of copper, or copper alloys, or iron, whether wrought or cast,—being a communication. Sealed 29th January—6 months for inrolment.

Michael Rimington, of No. 10, Rufford-row, Islington, Middlesex, Gent., for certain improvements in obtaining and applying motive power,—being a communication. Sealed 31st January—6 months for inrolment.

George Hinton Bovill, of Millwall, in the county of Middlesex, engineer, for improvements in the manufacture of iron. Sealed 31st January—6 months for inrolment.

Andrè Etienne, of Hatton Garden, in the city of London, Gent., for improvements in the construction of railways, railway carriages, and in the means of preventing accidents on railways. Sealed 31st January—6 months for inrolment.

James Pilbrow, of Tottenham, in the county of Middlesex, civil engineer, for certain improvements in propelling on land and water. Sealed 31st January—6 months for inrolment.

Henry Highton, of Rugby, in the county of Warwick, Master of Arts, for improvements in electric telegraphs. Sealed 3rd February—6 months for inrolment.

Edwin Chesshire, of Birmingham, in the county of Warwick, surgeon, for improvements in apparatus to be applied to railway carriages, to reduce the prejudicial effects of collisions to passengers in railway carriages. Sealed 3rd February—6 months for inrolment.

Samuel Brown, of Gravel-lane, Surrey, engineer, for improvements in gas engines, and in propelling carriages and vessels. Sealed 3rd February—6 months for inrolment.

Thomas Foxall, Griffiths, of Wolverhampton, for improvements in stamping and shaping sheet metal. Sealed 3rd February—6 months for inrolment.

William Garnett Taylor, of Halliwell, in the county of Lancaster, cotton spinner, and William Taylor, of Halliwell aforesaid, labourer, for improvements in consuming smoke and economizing fuel. Sealed 3rd February—6 months for inrolment.

William Milligan, of Bradford, in the county of York, manufacturer, for certain improvements in the power loom. Sealed 4th February—6 months for inrolment.

William Greener, of Birmingham, gun-maker, and William Edwards Staite, of Peckham, Surrey, Esq., for improved means of ignition and illumination. Sealed 7th February—6 months for inrolment.

Thomas Clarke, of Hackney, Middlesex, engineer, Mark Freeman, of Sutton, Surrey, Gent., and John Varley, of Poplar, Middlesex, engineer, for certain improvements in obtaining and applying motive power; parts of which are applicable to the regulating and controlling of fluids. Sealed 11th February—6 months for inrolment.

James Palmer Budd, of Ystalyfera Iron Works, Swansea, merchant, for improvements in the manufacture of iron. Sealed 11th February—6 months for inrolment.

John Keating, of North Mews, Fitzroy-square, in the county of Middlesex, scagliolist, for certain improvements in the manufacture of cement. Sealed 11th February—6 months for inrolment.

Joseph Pierre Gillard, of Rue Martignac, in the city of Paris, Professor of Mathematics and Philosophy, for improvements in the production of heat in general. Sealed 11th February—6 months for inrolment.

Charles Lesley, of Bradford, in the West Riding of the county of York, stock and sharebroker, for certain improvements in machinery for raising and impelling water and other liquids, and also thereby to obtain mechanical power. Sealed 11th February—6 months for inrolment.

William Edward Newton, of the Office for Patents, 66, Chancery-lane, in the county of Middlesex, civil engineer, for improvements in the construction of instruments or apparatus for ascertaining, registering, and regulating the speed of carriages and machinery,—being a communication. Sealed 11th February—6 months for inrolment.

Andrew Smith, of Princes-street, in the county of Middlesex, engineer, for improvements in coating or covering metals for the purpose of preventing oxidation. Sealed 11th February—6 months for inrolment.

Alfred Vincent Newton, of the Office for Patents, 66, Chancery-lane, Middlesex, mechanical draughtsman, for certain improvements to be applied to the grinding of grain and other substances,—being a communication. Sealed 11th February—6 months for inrolment.

James Murdoch, of Staple Inn, in the county of Middlesex, mechanical draughtsman, for an improved process for preparing a certain material for the purpose of painting. Sealed 11th February—6 months for inrolment.

George Stephenson, of Tapton House, Chesterfield, in the county of Derby, engineer, and William Howe, of Newcastle-upon-Tyne, in the county of Northumberland, mechanic, for an improvement in locomotive steam-engines. Sealed 11th February—6 months for inrolment.

William Wharton, superintendent at the Euston-square Station of the London and Birmingham Railway, for certain improvements in straps and bands. Sealed 11th February—6 months for inrolment.

Charles Rowley, of Birmingham, button manufacturer, for improvements in buttons and other fastenings for wearing apparel, and in the machinery for manufacturing parts of the said fastenings. Sealed 11th February—6 months for inrolment.

John William Stanbridge, of 38, Brudenell-place, New-road, in the county of Middlesex, Gent., for an improvement in the manufacture of certain descriptions of silks and other fabrics. Sealed 11th February—6 months for inrolment.

John Brocklehurst, of Holborn, Middlesex, lamp manufacturer, for improvements in the hanging and disconnecting of window sashes and frames. Sealed 11th February—6 months for inrolment.

James Nasmyth, of Arundel-street, in the county of Middlesex, Gent., for certain improvements in engines or machines for obtaining and applying motive power. Sealed 16th February—6 months for inrolment.

William Edward Newton, of the Office for Patents, 66, Chancery-lane, Middlesex, civil engineer, for improvements in the prepation or manufacture of thread or yarn,—being a communication. Sealed 17th February—6 months for inrolment.

Jacque Kloet, of Manchester, Gent., for a certain improved combination of materials to be used as a substitute for leather or for waterproof cloth and other similar useful purposes. Sealed 17th February—6 months for inrolment.

Juan Nepomuceno Adorno, of Mexico, in the Republic of Mexico, Gent., for improvements in manufacturing cigars and other similar articles. Sealed 17th February—6 months for inrolment.

Edward Auguste Desire Guichard, of the Rue des Jeuneurs, Paris, in the Kingdom of France, for improvements in printing calico and other fabrics. Sealed 17th February—6 months for inrolment.

Stephani Etievant, of Church-street, Soho, in the county of Middlesex, for improvements in stoves,—being a communication. Sealed 17th February—6 months for inrolment.

Nicolas François Corbin Desboissierres, of Rue Saint Pierre Montmartre, in the Kingdom of France, Gent., for improvements in preparing and burning fuel. Sealed 17th February—6 months for inrolment.

Joseph Clinton Robertson, of 166, Fleet-street, London, civil engineer, for improvements in nail making machinery,—being a communication. Sealed 18th February—6 months for inrolment.

Robert Nisbet, of Lamden, in the county of Berwick, Esq., for certain improvements in locomotive engines and railways. Sealed 19th February—6 months for inrolment.

Peter Claussen, of Leicester-square, Middlesex, Esq., for certain improvements in machinery for weaving, and in preparing materials for weaving,—being a communication. Sealed 20th February—6 months for inrolment.

John Platt, of Oldham, in the county of Lancaster, machinist, for certain improvements in machinery or apparatus to be employed in the preparation and spinning of cotton and other fibrous substances. Sealed 25th February—6 months for inrolment.

John Britten, of Liverpool, chemist, for certain improvements in the method of applying heat for the purposes of heating, cooking, and evaporating, and in the apparatus connected therewith. Sealed 25th February—6 months for inrolment.

Peter Bancroft, of Liverpool, merchant, for certain improvements in the method or process of refining and purifying animal and vegetable oils and grease. Sealed 25th February—6 months for inrolment.

John Harcourt Brown, of Brunswick-place, Barnsbury road, Gent., for improvements in securing letters, envelopes, covers, despatches, packets, and parcels. Sealed 25th February—6 months for inrolment.

Thomas Murgatroyd Dean, of Stockport, in the county of Chester, engineer, for certain improvements in machinery or apparatus applicable to the furnaces or fire-places of steam-engines or other boilers. Sealed 25th February—6 months for inrolment.

Moses Poole, of the Bill Office, London, Gent., for improvements in cleaning and separating grain and other seeds,—being a communication. Sealed 25th February—6 months for inrolment.

Antonio James Mayer, of Ashley-crescent, City-road, for improvements in certain wood-cutting machines. Sealed 25th February—6 months for inrolment.

Josué Heilmann, of Mullhausen, in the Department du Haut Rhine, in France, machine-maker, for improvements in certain machines used for preparing to be spun cotton, wool, and other fibrous materials. Sealed 25th February—6 months for inrolment.

William James Cantelo, of Paris-street North, Lambeth, for improvements in apparatus for hatching eggs, and raising the young; and for heating hot-houses and other buildings. Sealed 25th February—6 months for inrolment.

Thomas Pemberton, jun., of Birmingham, manufacturer, for a new or improved method, or new or improved methods of ornamenting window furniture and articles of upholstery in general. Sealed 25th February—6 months for inrolment.

William Robertson, of Gateside, Renfrewshire, machine-maker, for certain improvements in the machinery for spinning and twisting cotton, silk, wool, flax, and other fibrous substances, Sealed 25th February—6 months for inrolment.

George Alexander Thompson, of Connaught-terrace, Hyde Park, Gent., and Joseph Wright, of Holborn-bars, mechanic, for improvements in propelling vessels. Sealed 25th February—6 months for inrolment.

John Maddock, of Burslem, Staffordshire, earthenware manufacturer, for a new and improved method of building and constructing kilns or ovens used by potters and manufacturers of china and earthenware. Sealed 25th February—6 months for inrolment.

CELESTIAL PHENOMENA FOR MARCH, 1846.

D.	H.	M.	
1			Clock before the sun, 12m. 37s.
	—		☽ rises 8h. 9m. M.
	—		☽ passes mer. 3h. 21m. A.
	—		☽ sets 10h. 15m. A.
	9	54	♃'s first sat. will em.
	14	11	♃ in conj. with the ☽ diff. of dec. 1. 5. S.
	18	8	☿ in conj. with ♀ diff. of dec. 11. 36. S.
2	2	39	♂ in conj. with the ☽ diff. of dec. 1. 28. N.
	9	12	♀ in inf. conj. with the ⊙
4	10	32	☽ in □ or first quarter
5			Clock before the sun 11m. 46s.
	—		☽ rises 10h. 43m. M.
	—		☽ passes mer. 6h. 43m. A.
	—		☽ sets 1h. 53m. M.
	12	46	☿ in sup. conj. with the ⊙
6	22	35	♀ in conj. with Pallas
7			Occul. *k* Geminor., im. 12h. 22m.
8	7		☽ in Apogee
9			Occul. *k* Cancri, im. 10h. 38m. em. 11h. 48m.
10			Clock before the sun, 10m. 32s.
	—		☽ rises 3h. 34m. A.
	—		☽ passes mer. 10h. 32m. A.
	—		☽ sets 4h. 55m. M.
11			Occul. *n* Sextantes, im. 14h. 1m. em. 15h. 3m.
11	8	6	♃'s second sat. will em.
13	2	49	Ecliptic oppo. or ○ full moon.
14			Occul. 50 Virginis, im. 15h. 41m. em. 16h. 51m.
15			Clock before the sun, 9m. 9s.
	—		☽ rises 9h. 7m. A.
	—		☽ sets 1h. 29m. M.
	—		☽ passes mer. 6h. 50m. M.
	7	22	♃'s third sat. will em.
17	5	53	☿ in conj. with Ceres
	6	35	☿ in the ascending node
	8	15	♃'s first sat. will em.
18	4	52	☿ in conj. with ♅ diff. of dec. 0. 55. N.
	—		Mercury R. A. 0h. 34m. dec. 3. 53. S.
	—		Venus R. A. 22h. 15m. dec. 3. 5. S.
	—		Mars R. A. 3h. 31m. dec. 20. 5. N.
	—		Vesta R. A. 4h. 42m. dec 21. 6. N.
18			Juno R. A. 15h. 18m. dec. 6. 10. S.
	—		Pallas R. A. 22h. 44m. dec. 0. 15. N.
	—		Ceres R. A. 0h. 30m. dec. 5. 0. S.
	—		Jupiter R. A. 2h. 33m. dec. 14. 10. N.
	—		Saturn R. A. 21h. 53m. dec. 14. 5. S.
	—		Georg. R. A. 0h. 35m. dec. 3. 9. S.
	—		Mercury passes mer. 0h. 52m.
	—		Venus passes mer. 22h. 28m.
	—		Mars passes mer. 3h. 48m.
	—		Jupiter passes mer. 2h. 50m.
	—		Saturn passes mer. 22h. 7m.
	—		Georg. passes mer. 0. 53.
20			Clock befere the sun 7m. 58s.
	—		☽ rises 0h. 30m. M.
	—		☽ passes mer. 4h. 53m. M.
	—		☽ sets 9h. 14m. M.
	1	58	☽ in □ or last quarter
	11	46	⊙ enters Aries,—spring commences
21	6	47	♀ stationary
	20	10	☿ in Perihelion
22	10		Ceres in conj. with ♅ diff. of dec. 7. 31.
24	3	50	♄ in conj. with ☽ diff. of dec. 6. 24. S.
	7		☽ in Perigee
	12	9	♀ in conj. with the ☽ diff. of dec. 1. 25. N.
25			Clock before the ⊙ 6m. 9s.
	—		☽ rises 4h. 44m. M.
	—		☽ passes mer. 10h. 29m. M.
	—		☽ sets 4h. 26m. A.
27	2	22	♅ in conj. with the ☽ diff. of dec 3. 13. S.
	5	51	Ecliptic conj. or ● new moon
28	2	52	☿ in conj. with the ☽ diff. of dec. 1h. 10m. N.
29	9	38	♃ in conj. with the ☽ diff. of dec. 0. 21. S.
30	15	46	Ceres in conj. with the ⊙
	18	15	☿ greatest elong. 18. 53. E.
	19	58	♅ in conj. with the ⊙
	22	14	♂ in conj. with the ☽ diff. of dec. 3. 24. N.

J. LEWTHWAITE, Rotherhithe.

THE

LONDON JOURNAL,

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CONJOINED SERIES.

No. CLXXII.

RECENT PATENTS.

To William Pollard, *of Newcastle-upon-Tyne, Gent., for certain improvements in the production of combustible gases, and in the application of the same as fuel.*—[Sealed 23rd June, 1845.]

This invention consists, firstly, in applying a blast of highly heated steam, in conjunction with atmospheric air, to convert solid fuel into combustible gases in appropriate furnaces, which gases are conveyed away by suitable flues or pipes to any place where they may be required to be burned;—and, secondly, in burning the said combustible gases with a blast of hot air, to produce heat for all purposes for which solid fuel has hitherto been employed.

The patentee remarks, that he is aware carbonic oxide gas has been frequently employed as fuel, but by his invention the mixture of carbonic oxide and hydrogen (obtained by a combined blast of highly heated steam and atmospheric air, acting on ignited fuel in excess as aforesaid), will consist, as nearly as possible, of one equivalent of hydrogen, and two equivalents of carbonic oxide, accompanied by the corresponding equivalents of nitrogen gas.

To demonstrate the superior value, as fuel, of the mixture of hydrogen and carbonic oxide, as aforesaid, over carbonic oxide alone, it is sufficient to state the following facts:—The calorific power of the gases obtained by burning 36 lbs. of dry air, and 9 lbs. of heated steam, in an excess of ignited fuel, may be represented theoretically by 3,—they consist of 4 volumes of carbonic oxide, 2 volumes of hydrogen, and 4 volumes of nitrogen, in all 10 volumes, of which the proportions of the combustible are to the incombustible gases as 6 to 4, and if taken by weight as 29 to 28, the total weight being 57 pounds, and the consumption of solid carbon 12 pounds.

The calorific power of the gases obtained by burning, under similar circumstances, 72 pounds of dry air, without the addition of the heated steam, may be theoretically represented by 2,—the consumption of solid carbon being also, in this case, 12 pounds; the gases consist of 4 volumes of carbonic oxide, and 8 volumes of nitrogen,—total 12 volumes. The ratios of combustible to that of incombustible gases are as one to two, either by weight or volume, and the total weight is 84 pounds.

When equal weights of the two gases are compared the theoretical calorific powers of each are as 221 to 100, but in practice the useful effect is much more in favor of the mixed carbonic oxide and hydrogen, especially when a high temperature is required. In these calculations no notice is taken of fractional parts, nor of the volatile matters contained in the fuel burned, as they do not alter the economical results. The advantages of employing the combustible gases produced in the manner above mentioned, as fuel, are thus stated:—First: effectually preventing the smoke nuisance. Second: the power of regulating the temperature in metallurgical and other manufacturing operations in reverberatory furnaces, with a precision extremely difficult to obtain by the usual methods with solid fuel. By varying the proportions of hot air, and of the combustible gases, the heat can be raised or lowered in a moment, and the flame rendered oxidating, or reducing, or neuter, with the facility attending blow-pipe operations on a small scale. The advantages attending such an arrangement will immediately strike any one accustomed to these matters. Third: a complete command over the caloric, and over the volatile gaseous products generated by combustion. When we reflect on the very small proportion of the total heat produced, which can be, or is, utilized in reverberatories depending on common fire-places and chimney draft, the superiority of the gas reverberatories is immediately apparent. In the latter, worked by a blast or artificial current of air, the totality of the heat generated by combustion can be applied to useful purposes in general; the waste caloric will be most effectually expended in heating the air for burning the gas, but there are many other obvious ways of employing it. Fourth: in gas furnaces the necessity of high and expensive chimneys is completely done away with. Fifth: the complete command over the volatile and gaseous products of combustion is of great importance in many metallurgical operations, such as in smelting copper, lead, tin, &c. A nuisance hitherto inseparable from these operations may thus be obviated, and many valuable substances, hitherto wasted, may be turned to useful account. Sixth: the most inferior kinds of fuel, even such as can scarcely be used for any practical purpose in their natural or solid state, may be employed to produce valuable combustible gases, in the manner above set forth.

To conclude: after making ample allowance for the costs of generating and heating the steam, of blowing and heating the air, the original costs, and wear and tear of apparatus, &c., it will be found, that an enormous saving will be effected by the application of gas fuel generally in metallurgical and manufacturing operations, for heating steam-boilers, and for almost every other purpose for which solid fuel has hitherto been used.

For generating the gases, the patentee prefers to employ a furnace upon the plan used in smelting iron ores, with a fuel-chamber above the boshes of a sufficient height to secure the perfect decomposition of carbonic acid. The furnace should, besides, be provided with close covers or slides, at the charging-plate, and with lateral flues and pipes to convey the combustible gases to their destination.

It is advisable to use a proper flux to convert the earthy parts of the fuel into a fusible slag, which may be run off as formed, or be tapped periodically, as may be found most convenient; open burning fuel, or a mixture of open burning and caking fuel, is more convenient for generating gas than the very bituminous caking sorts; when the latter are used, it might be advisable to employ a stirring apparatus to facilitate the descent of the charges.

To produce the blast, the patentee prefers using steam, at a pressure of from two to three atmospheres. After leaving the boiler, it passes through a common heating apparatus of iron pipes, in which it is heated from 570° to 600° Fahrenheit, or upwards; the steam-pipe is contracted considerably at the jet, which may be made to terminate at or within the mouth of a common open tuyer or tuyers, or be inserted within a closed hot-air tuyer, and, pointing towards the nozzle, the blast of steam will always draw after it a sufficient proportion of air to effect a perfect combustion of the fuel. Hot air is not indispensable, for with cold air the operation succeeds perfectly; but either hot or cold air may be used.

The dimensions of the apparatus will of course vary according to the quantity of solid fuel required to be converted into gases: one gas generator may serve to supply several gas furnaces.

The mode of applying the combustible gases as fuel, and the construction of furnaces, may be varied considerably, according to circumstances; the only thing to be particularly attended to is, to arrange the jets or orifices for the issuing currents of combustible gases and hot air in such a manner, that the mixture of the two shall be as complete as possible, and the combustion be effected at that part of the furnace where it will produce the most powerful effect. After the flame has done its office in one part of the furnace, it enters an oven, or wide flue, and heats the air-pipes placed therein. Cold air is blown in at the top, and in descending the circumvolutions of the pipes it becomes gradually heated to the degree required; the hot air is conducted, in suitable pipes, to the point where the gas jets are situated, and the mixture is there inflamed. Both the gas and air-pipes are provided with throttle-valves or cocks, by which the quantities may be regulated at pleasure. All these matters being well understood, and daily practised with combustible gases obtained from iron furnaces, it will not be necessary to enter into more minute details on the subject.

The patentee, in conclusion, states, that he does not claim, as new, the employment of carbonic oxide gas as fuel; but that which he does claim is the employment of a mixture of carbonic oxide gas and hydrogen, obtained by means of a combined blast of highly-heated steam and atmospheric air, acting on ignited fuel in excess, as above described.—[*Inrolled in the Petty Bag Office, December,* 1845.]

Specification drawn by Messrs. Newton and Son.

To PIERRE THIRION, *of Hitts-place, Clerkenwell, in the county of Middlesex, fur skin dresser, for an invention of certain improvements in dressing furs and skins,—being partly a communication.*—[Sealed 3rd June, 1845.]

THIS invention of improvements in dressing furs and skins consists in the employment of certain apparatus for facilitating the operation to which the furs and skins are subjected during the process of dressing. The ordinary mode of proceeding is to take the skins, in their stiff or air-dried state, and place them in suitable tubs, where they undergo a treading operation from men's feet, until they are sufficiently soft to bend easily. The skins, if large, are sewn up, the fur being turned inwards; but if small skins, such as ermine, are being dressed, they require no sewing, as they, in the first instance, are turned fur inwards to dry. This sewing is preparatory to the greasing with butter or lard, and is intended to keep the grease from the fur, and further assists in softening the skins, which are again submitted to the treading operation. The next part of the process is to wet the skins, and remove the flesh therefrom. When "fleshed," they are hung up to dry. A similar operation of treading with the workman's feet is then repeated, for making the skins soft; after which they are placed in tubs containing saw-dust, and again trodden by men's feet. They are next submitted to the operation of treading, in suitable tubs, with plaster of Paris, whitening, or some other equivalent substance, sprinkled between the layers of skins.

After this operation the skins are taken out and beaten with a stick, to rid them of the plaster of Paris, or other substance. They are then combed, and the dressing is complete. This is a general description of the various operations under which furs and skins have to pass before the dressing is completed; and although the order and the repetition of these operations are determined according to the kind and quality of the skins, yet it will be sufficient to shew in what stages of the process the present improvements are to be used. In the first place, instead of softening the skins by the action of treading, the patentee employs beating-stocks, of various sizes, according to the kind of skins to be dressed, and of a similar construction to the ordinary fulling-mill. When somewhat softened, the skins are sewn up (the fur inwards) and greased; they are then again submitted to the beating-stocks until sufficiently soft and ready for the next operation.

In Plate VII., the construction of beating-stocks, intended to be employed for this purpose is shewn. Fig. 1, is a sectional elevation of the apparatus, in which A, is a strong vessel for containing the goods to be operated upon; B, B, are standards for supporting the shaft C, which forms the fulcrum for the arms of the beaters D, D;—E, E, are arms, keyed upon a shaft F, which is mounted in standards G, G. Upon rotary motion being communicated to the shaft F, the arms E, will come in contact with the outer end of the arms of the beaters, raise them up and let them fall upon the goods in the vessel A. By this means the skins will be forced upwards, and coming in contact with a board or cover H, be turned over and over in the vessel, and softened in a comparatively short time. The skins are then fleshed in the ordinary manner, and returned to the beating-stocks, where mahogany or any other suitable wood-dust is sprinkled upon the fur, according to the quality of the skins under operation, before the beating is recommenced. When the action of the beaters has been continued for the requisite time, the skins are taken out of the apparatus, and placed in a heated barrel, which is furnished on its interior surface with radial pins, for turning the goods over and over, in order that they may be acted upon by various dry substances, which are thrown into the barrel to absorb the fat from the skins. This apparatus, which is also intended to supersede the arduous operation of the workman's feet, is shewn in sectional elevation at fig. 2. It consists of a framing A, A, which supports a hollow shaft B, forming the axle of the barrel C. This barrel, as beforementioned, is provided with pins *a*, *a*, and a door *b*, through which entrance is obtained to the barrel. Through the hollow shaft B, steam is passed, by a steam-pipe D, provided with a stop-cock, and leading to the hollow shaft from an adjacent steam-boiler. When the skins or furs are placed in the barrel C, sand, flour, saw-dust, or some other dry suitable material, is thrown therein. Rotary motion is then to be communicated from any prime mover to the apparatus, by a band and pulleys, as shewn in the drawing, and the steam let on to the hollow shaft. By this means the skins will be heated, and the fat contained therein being in a measure dissolved, the sand, flour, or other exsiccative substance, will readily absorb it. It has been found advisable to take the skins or furs frequently out of the barrel and comb them, in order to examine each, and see the progress of the operation. Such as have been sufficiently acted upon may then be put aside, and the others returned to the barrel, when the operation is continued until they have arrived at the same state as those already laid aside.

The last part of this invention refers to clearing the furs and skins of the wood-dust, sand, plaster of Paris, or other substance which may have been employed in the process of dressing. This is effected by the apparatus shewn at figs. 3, and 4, and is intended to supersede the mode of beating by hand, as at present practised. Fig. 3, shews the apparatus in front elevation, and fig. 4, is a cross section of the same, taken in the line 1, 2, fig. 3. It consists of a cylindrical grating, composed of metal rings *a, a,* which are attached together by horizontal rods *b, b,* passing through them, and bolted at each end to a disc *c,* which forms the ends of the grating; *d, d,* are studs, attached to the discs *c,* and forming the axle of the cylindrical grating, which is mounted on standards *e, e,* and is made to rotate by means of a band and pulleys, actuated by any first mover; *f,* is a door, through which the goods to be freed from dust and dirt are placed in the grating; *g, g,* are horizontal bars, provided with pins *h, h,* projecting inwards, and by means of these pins the goods, during the rapid revolution of the cylindrical grating, are turned over and thrown against the bars of the grating, and effectually cleared of the materials which have been employed in the previous operation. The goods, when taken out of the grating, are then to be combed by hand; after which the dressing is completed.

The patentee claims, Firstly,—the application to the dressing of furs and skins of beating or fulling-stocks, as above described. Secondly,—the application of a rotary barrel or cylinder, furnished with suitable projections inwards, and provided with a heated pipe, as above described. And, Lastly,—the application of a rotary cylindrical grating for clearing the furs and skins of the materials which may be employed in the operations to which such furs or skins are subjected.—[*Inrolled in the Petty Bag Office, December,* 1845.]

Specification drawn by Messrs. Newton and Son.

To John Thomas Perkins, *of Monmouth-street, in the county of Middlesex, pattern-card maker, for his invention of certain improvements in machinery or apparatus for cutting paper and other fabrics.*—[Sealed 22nd April, 1845.]

This invention of improvements in apparatus for cutting paper and other fabrics, consists in a novel arrangement of machinery whereby a horizontal saw-blade or knife is actuated and brought gradually down through a pile of paper, pasteboard, paper and cloth, or other similar material, placed beneath it.

In Plate VIII., several views of the improved machinery to be employed for this purpose are shewn. Fig. 1, is a front elevation of the machine complete, and fig. 2, is a side view of the same. A, A, are cast-iron side-framings, attached together by horizontal rods *a, a,* as shewn at fig. 1; B, B, are standards, cast in one piece with the side-framings A. In the centre of these standards a slot *b,* is made, to receive the ends of the press-follower C, which is furnished with a screw *e,* working in a socket *d,* in the head D, of the framing. To the upper end of the screw *c,* a fly-lever is attached, by the rotation of which the press-follower C, is brought down and made to hold the paper, or other material, firmly upon the bed of the machine. E, E, are brackets, bolted to the side-framing, for the purpose of carrying the horizontal shaft F, and crank-shaft G. Upon one end of the shaft F, the fast and loose pulleys *e, e,* are keyed, and to the other end a handle *f,* is attached. Motive power may thus be communicated to the shaft F, either from a steam-engine or by manual labour. *g,* is a cog-wheel, keyed to the shaft F, and is in gear with the pinion *h,* on the crank-shaft G; *i,* is a fly-wheel on the same shaft, for steadying the motions of the machine. The crank-shaft G, by means of the connecting-rod *k,* communicates a lateral motion to the horizontal saw or cutter H, which works in guides in the standards B, B. In the side of the guides a series of studs are screwed, which project inwards and abut against the cutter H, to steady its motion. I, is the bed, upon which a wooden table, for holding the paper, is placed; and it is further supported by a ledge on each side of the framing A, A. In front of this framing, and working in bearings thereon, is a horizontal shaft K, which carries two segment racks *l, l,* and about midway of the length of this shaft a weighted pulley *m,* is keyed. There is also keyed upon the shaft K, a ratchet-wheel *n,* (into which a catch *n*,* takes at certain periods of the operation) and likewise a lever *o,* for the purpose to be hereafter explained.

Attached to the inner side of the framing A, are the guide-rods *p*, *p*, upon each of which a vertical rack *q*, *q*, furnished with lugs or ears, slides. These racks are connected together (in order that they may move simultaneously) by a horizontal rod *r*, to each end of which a vertical rod *s*, is jointed, their upper ends being jointed to the knife or cutter.

The following is the mode of working the improved machine:—Before placing the paper, or other material to be cut, in the machine, it will be necessary to raise the cutter H; this is effected by depressing the lever *o*, on the shaft K, which will actuate the segment-racks, and raise the racks *q*, *q*, together with the bar *r*, and the vertical rods, and, consequently, the cutter attached thereto. The paper, or other material, is then placed upon the table, in the required position beneath the cutter, and the press-follower C, is brought down tight upon the paper. Rotary motion is then given to the cog-wheel *g*, by means of the handle *f*, or the pulley *e*, (as the case may be), and the pinion *h*, taking into the wheel *g*, the crank-shaft G, will be made to rotate, and communicate the required lateral motion to the cutter H. Should the weight of the blade or knife, and the parts in immediate connection therewith, be found insufficient to produce a good cutting pressure on the material under operation, as is sometimes the case when cutting mill board, a weight is applied to the pulley *m*, as shewn in the drawing. When the blade H, has arrived at the bottom of the pile of paper, its lateral movement may be stopped, if required, by throwing off the driving-strap from the pulley, or stopping the winch-handle, as the case may be. The press-follower C, is then raised by reversing the motion of the screw *c*, and the blade or cutter is also raised, as before explained, and held in its suspended position by the catch *n**, taking into the teeth of the ratchet-wheel.

In order to bring forward the paper or other material under operation, so that it may receive the next cut exactly parallel to the former one, the apparatus shewn in plan view at fig. 3, is provided. It consists of a rod *t*, mounted on the outside of the framing A: on one end of this rod is a handle *u*, and the other end is tapped to any desired length, in order that it may work in a moveable boss *v*. Attached to this boss is a bar *w*, which stretches across the framing, and is furnished at its other end with a hollow rod *x*, through which a solid rod *y*, affixed to the framing, passes, forming a guide to steady the bar *w*, in its backward and forward motion. To the bar *w*, a board is attached, which, being brought forward by the rotation of the handle on the rod *t*, will push the paper or other material to the front of the machine, keeping it exactly parallel to the blade or cutter H. When arrived at the required position on the table, the paper is held down as before, and the cutter set in action as above explained.

A modification of the improved paper cutting machine will be seen at fig. 4. In this arrangement it is proposed to cast the standards B, B, separate from the framing, and attach them thereto by a hinge. The cutter, in this instance, works in guides separate from the standards. By this means the upper part of the machine, which may be called the press, can be thrown back into a horizontal position after the paper is cut, and the edges may be gilt without removing the paper from the machine. At fig. 5, the kind of knife best adapted for cutting mill-board is represented, but for woollen and cotton goods a straight-edge, similar to that shewn at fig. 6, is used.

The patentee, in conclusion, states, that he does not confine himself to the precise arrangement shewn in the drawing, as the movement of the saw blade or knife can be obtained by the direct application of the motive power to the crank-shaft, and other modifications might also be suggested without departing from the nature of the invention; but he claims, Firstly,—the general arrangement of machinery above described and shewn in the drawings. Secondly,—the mode of communicating a lateral and at the same time a downward motion to the saw blade or knife. And Lastly,—the modification shewn at fig. 4, of the drawing, whereby the edges of paper, paper cloth, and other materials, may be gilded in the paper cutting machine.—[*Inrolled in the Petty Bay Office, October,* 1845.]

Specification drawn by Messrs. Newton and Son.

To John Coope Haddan, *of Liverpool-street, King's Cross, in the county of Middlesex, civil engineer, for improvements in the mode of manufacturing papier-maché and other articles made of vegetable pulp.*—[Sealed 21st November, 1843.]

This invention consists in combining successive layers of wet pulp (such as is ordinarily used in the manufacture of paper), by winding such pulp round a cylinder, until it becomes of the required thickness, and then cutting it off, pressing, and drying it.

In Plate VIII., fig. 1, is an elevation, partly in section, of a cylindrical paper-machine. *a*, is the vat, containing pulp prepared by any of the usual methods (but the patentee prefers pulp made of old colored cotton rags carefully sorted); *b*, a cylinder or drum, covered with fine wire cloth, for raising the pulp from the vat; and *c*, another cylinder or drum, of wood or other light material, that receives the pulp from the cylinder *b*, and around which the pulp is wound, until the desired thickness is obtained,—the cylinder *c*, bearing upon the cylinder *b*, with sufficient pressure to cause the successive layers to adhere together. On the axle of the cylinder *b*, is keyed a small worm-wheel *d*, and at the end of the axle an arm *e*, is loosely fitted, supporting a spindle *f*; this spindle is driven by a band passing round the pulley *g*, and carries, near its lower end, an endless screw or worm *h*, which gears into the worm-wheel *d*. The axle of the cylinder *c*, carries a worm-wheel *i*; and at its end an arm *j*, is loosely fitted; the forked extremity of this arm supports the upper end of the spindle *f*, on which an endless screw or worm *k*, is mounted, for the purpose of driving the worm-wheel *i*. The upper end of the spindle *f*, is capable of moving freely in the fork of the arm *j*; and the screw *k*, has also a sliding action on the spindle, but it is caused to rotate therewith by means of a tongue or feather; this arrangement admits of the distance between the centres of the cylinders *b*, *c*, being progressively increased as successive layers of pulp are wound upon the cylinder *c*. The pressure of the cylinder *c*, against the cylinder *b*, is produced by mounting the former in the upper ends of two levers *l*, one at each side of the vat; these levers turn upon fulcrums *m*, at their lower ends, and to each a cord *n*, is attached, which passes over a pulley *o*, at the other end of the vat, and supports a weight: the degree of pressure may be varied by altering the size of the weights. An increased consistency may be given to the pulp by applying a dandy-roller at *p*.

Fig. 2, represents an apparatus to be used with an ordinary Fourdrinier machine for making papier-maché according to this invention. *a*, is the framing, furnished with forked arms *b*, at the top, to support the axle of the cylinder *c*, on which the layers of pulp are to be wound; *d*, is an endless felt, that receives the pulp as it comes from the paper-making machine, and delivers it to the cylinder *c*;—*e*, is a roller, the axle of which has free vertical motion between two guides *f*, *f*, and is supported by a weighted lever *g*; this roller presses against the under surface of the felt, with a degree of force just sufficient to press the successive layers of pulp together.

The mode of cutting and removing the roll of pulp from the cylinder, which must be done whilst the pulp is quite wet, is as follows:—Two clamps or bars, shewn at *a*, *b*, in fig. 3, are screwed on the pulp, one-eighth of an inch apart, and a cutting tool is introduced between them to cut the pulp; the cylinder of pulp *c*, being thus cut through, is placed near the end d^1, of the plate *d*, and the clamp *b*, is taken off; the cylinder is then carefully rolled to the opposite extremity of the plate, and the remaining clamp *a*, being removed, the whole of the pulp will be deposited on the plate, in the form of a flat sheet.

If the sheet of pulp is to remain flat, it must be pressed between flat surfaces, from time to time, whilst drying; but it may be pressed into a variety of shapes, if required. The sheet of dryed pulp or papier-maché may then undergo the ordinary process of dipping, for the purpose of impregnating it with oil or fatty matter; and, after saturation, the sheet is to be again dried, and finally subjected to pressure.

The patentee does not claim the machinery above described, nor the making of papier-maché by causing successive layers of pulp to adhere together by pressure; nor the process of dipping above mentioned; but he claims the mode of combining successive layers of wet pulp together by winding such wet pulp round a cylinder, and afterwards cutting it off and drying it, as described.—[*Inrolled in the Inrolment Office, May,* 1844.]

To PATRICK SANDEMAN, *of Greenside-place, Edinburgh, upholsterer, for improvements on coffins.*—[Sealed 21st July, 1845.]

THESE improvements in coffins consist, firstly, in the employment of sheet metal instead of wood for the whole of the coffin, except an outer bottom of wood to give sufficient strength; secondly, in forming a narrow trough all round the edges of the sides and ends, to be filled with any adhesive cement, into which a tongue made on the under side of the lid will descend, and thus form an air-tight joint; thirdly, in so constructing the lid that a portion of it may be raised, in order to view the face of the deceased; and fourthly, in a mode of arranging the ropes which are to be attached to the coffin, for the purpose of lowering the same into the grave, by coiling up the ropes, and concealing them in ornamental tassels.

In Plate VIII., fig. 1, is a transverse section of a coffin made according to this invention; fig. 2, is a perspective view of an improved coffin upon its stand; and fig. 3, is an enlarged section, exhibiting the method of securing the lid. The sides *a, a,* as well as the ends, are made of sheet metal; their lower edges are turned under a wooden bottom *b,* to which they are firmly nailed; and around the upper edges a narrow trough *c,* is formed, to receive the tongue *d,* on the under side of the lid *e.* *f,* is a metal bottom, soldered to the sides and ends, above the wooden bottom. The lid is composed of two parts, *e,* and *e**; the part *e,* has a tongue formed on its under surface, round the foot-end and both sides; and at the other end, on the upper surface, is a trough *f*: the part *e**, is hinged to the head of the coffin, and has a tongue all round its under surface to dip into the troughs *c,* and *f.*

The mode of fastening down the lid is as follows:—In the centre of the trough *c,* (fig. 3,) a nut *g,* is soldered, and immediately over it a female screw is formed in the tongue *d*, which is hollowed out so as to fit over the nut *g*, like a cap, leaving a small space around it for the reception of cement; *h*, is a male screw, that passes through the female screw into the nut *g*, and thus firmly secures the lid upon the coffin.

After the body is placed in the coffin, and the trough *c*, filled with cement, the part *e*, of the lid is put in its place, and fastened by the screws above-mentioned; the trough *f*, is then filled with cement, and the part *e**, of the lid is shut down; by which means, the coffin will be closed air-tight, and any escape of noxious effluvia or liquid therefrom, entirely prevented.

Fig. 4, is a section of one of the tassels, shewing the coil of rope *i*, within, to be used for lowering the coffin into the grave; the rope being uncoiled for that purpose by pulling out the end *j*.—[*Inrolled in the Inrolment Office, January*, 1846.]

To RICHARD SIMPSON, *of the Strand, London, Gent., for an invention of certain improvements in bleaching yarns and fabrics,—being a communication.*—[Sealed 12th July, 1845.]

THIS invention of improvements in bleaching yarns and fabrics consists in the employment of certain solvents, by which the yarns or fabrics of linen are to be prepared for bleaching, before the ordinary means or processes of bleaching are resorted to. These solvents are to be applied to the yarns or fabrics of linen in a preparatory process of boiling, prior to the goods being immersed in the ordinary bleaching materials.

The solvents to be employed are either simple acids, followed by solutions of soda-ash, or acids, combined with soda-ash, in which the yarns or fabrics of linen are to be boiled for a space of time to be regulated according to circumstances, and the application may be varied according to the character or condition of the material to be acted upon.

A composition of solvents which has been found to answer for this purpose, is made by 22 lbs. of sulphuric acid of the first quality and strength, diluted in 50 gallons of pure water, which are to be boiled together in a leaden vessel, and, whilst boiling, 1 cwt. of the best soda-ash is to be introduced into the liquor, by small quantities at a time. The effervescence having ceased, the mixture must be kept boiling until the soda-ash is quite dissolved; and then, the sediment having been allowed to subside, the liquor may be drawn off quite clear, in which state it will be fit for use; but, if desired, the liquor may be evaporated, and its essential properties crystallized into the state of salt.

When the solvent material is prepared for acting upon cloth or particular kinds of yarns, it may be desirable to render it caustic, which is done by adding to the above compound about half a hundred-weight of lime, and an equal quantity of potash.

As cloths and yarns vary in quality, the patentee has thought it desirable to describe two or three ways (which have been found successful) of applying this material. First: for 10 cwt. of yarns, take 20 gallons of the prepared solvent liquor, and boil it in a sufficient quantity of water; when cold, throw in the yarns, and allow them to steep in the liquor for about 12 hours; then, after washing in clean water and squeezing the yarns, throw them into a tub of sours, prepared with about 2 parts of vitriol to 98 of water; let the yarns remain 5 or 6 hours in this solution, and then wash them in pure water and squeeze them, when the yarns will be ready for the usual process of bleaching. Second: for 10 cwt. of yarns, take 20 gallons of the prepared liquor; throw in the yarns, and boil them in it for two or three hours; then wash and squeeze, and proceed with the sours as usual. Third: when the yarn is very inferior in quality, after submitting it to the first described process, boil it two hours in a weak solution of soda-ash with a sufficient quantity of water. Fourth: instead of using the prepared liquor, steep the yarns for five hours in warm water (at about 68° Fahr.), in which water about 2 parts, by measure, of vitriol to 98 of water has been previously mixed; then wash and squeeze the yarns, and afterwards boil them for two hours in a weak solution of soda-ash. Fifth: for cloth and other fabrics, the caustic preparation may be desirable in which lime has been incorporated as above described.

With these instructions it is considered that an experienced bleacher will be enabled to vary the proportions of materials, and the time of boiling, according to circumstances, arising out of the quality of the goods to be operated upon.

In the preparation of cloths for bleaching, a mechanical contrivance may be desirable, by which the cloths shall be conducted by a series of small rollers, set in a pan or trough, filled with the caustic liquor above described, kept constantly boiling. Upon the machine a pair of squeezing-rollers should be mounted, between which the cloth may be made to pass, and then enter a second pan or vat, and in like manner be conducted, by a series of rollers, through a solution of soda-ash, kept boiling; and after again being squeezed by rollers the cloth may be wound upon a portable beam-roller, ready to be taken to the bleaching apparatus.

The patentee does not, however, consider any of these machines to be new, but limits his claim of invention to the processes of preparing yarns and fabrics of linen for bleaching as above described.—[*Inrolled in the Petty Bag Office, January,* 1846.]

Specification drawn by Messrs. Newton and Son.

To CHARLES GOODWIN, *of Bow-lane, in the county of Middlesex, ship surveyor, for certain improvements in masts and spars.*—[Sealed 30th June, 1845.]

THIS invention consists in certain methods of cutting timber into pieces suitable for masts and spars, and combining such pieces for the construction of masts and spars; the object being to effect a saving in the cost of the material, and an increase in the strength and durability of the masts and spars when manufactured.

In Plate VII., fig. 1, represents the end of a balk or log, fifty feet long, and fourteen inches square, to be used with several others for forming a mast ninety-nine feet long. Each log is sawn lengthwise in the direction of the dotted lines *a, a,* which converts it into two main "flitches" *b, b,* leaving for waste the small outside portions *c, c*; the two flitches are placed in contact, in the manner exhibited at fig. 2, and then scarfed together longitudinally for two-fifths of their length, and made fast to one another by square metal dowels *d*. Five of such double flitches being brought together round a core, as at fig. 3, they form the mast required; and the effect of thus bringing together five double flitches, scarfed to the extent before stated, is, that there is a ten feet longitudinal shift in each case, and four single flitches between every two butts *e*, as shewn in fig. 4, which represents the circumference of part of the mast, supposing it to be rolled into a plane. The mast is secured at the butts by "dump-bolts" *f*, and "through-bolts" *g*, (see fig. 3,); the flitches are then trimmed and planed on the outside into the proper cylindrical form, and finally hooped in the ordinary manner.

As the length of the balks varies, so also must the length of the shifts; the number of flitches between every two butts remaining the same: if, for example, the balks are sixty feet long, the shift of the butts will be twelve feet; but if they are only forty feet long, the shift will be eight feet.

A modification of the preceding plan is represented at figs. 5, and 6. The timber is only forty-eight feet long, but divided into twelve flitches, which allows of a shift of twelve feet; and there are only three flitches, instead of four, between every two butts. The shape of the core is slightly altered, to suit the increased number of flitches.

In both the above plans, and every modification thereof, the mast or spar must be formed in two halves, in consequence of the dowels and bolts being at right angles to the line of inclination of the flitches. The dowels are preferred to be made of what is termed Muntz's metal; but any other metal or composition of metals (except iron and its compounds) which will retain a firm hold, and resist corrosion, may be used.

The patentee claims, Firstly,—the mode of converting or cutting timber into pieces of forms suitable for masts and spars, as above described. Secondly,—the mode of combining the said pieces together into masts and spars, as described. Thirdly,—the use of metal dowels for connecting the flitches of masts together; whether they are shaped and combined according to the improved modes above described, or according to any other mode.—[*Inrolled in the Inrolment Office, December*, 1845.]

To James Stokoe, *of Newton, in the county of Northumberland, mill-wright, for improvements in purifying the vapours arising from smelting and other furnaces, and in recovering therefrom any useful matters which may be intermixed therewith.*—[Sealed 25th July, 1845.]

One of the methods now in use for purifying the vapours arising from smelting and other furnaces, and recovering the useful matters intermixed therewith, consists in giving such a direction to the vapours that they may, by virtue of their own moving force, pass through a filter or series of filters, containing stones, gravel, or similar materials, having water constantly passing between them; but this method is often found imperfect, owing to the sluggishness of the vapours, which linger at the entrance of the filters. To remedy this defect is the object of the present invention, which consists in combining an exhausting and forcing apparatus with the filters, in order to accelerate the ascent of the vapours from the furnace, and drive them rapidly into and through the filters.

The drawing in Plate VII., represents a vertical section of the filters with their appendages. *a*, is a rotary fan-wheel which receives motion through an endless band *b*, from the pulley *c*, driven by a steam-engine or other first mover; this fan-wheel draws the vapours with an increased degree of velocity out of the flue *d*, leading from the furnace, and drives them into the filtering and recovering case *e*. The case *e*, is rectangular, divided longitudinally, at about three-eighths of its height from the bottom, by a horizontal perforated partition *f*; the space above the partition is filled nearly to the top with stones, gravel, small pieces of wood, brushwood, heath, or other suitable filtering material; and the compartment below is filled with water to the level 1, 2, leaving an open space between the partition and the surface of the water, where the nozzle of the apparatus *a*, is introduced. The case is divided transversely by vertical partitions *g*, *g*, in the manner shewn, some of which rise to the top of the case, while the others do not extend so high, and are carried down through the partition *f*, into the water beneath. *h*, is a trough, divided into compartments by transverse partitions 3, 3, each compartment being also divided by four or more low parallel partitions; and the bottom of the trough is perforated with numerous holes. *j*, is a pipe for supplying water to the trough *h*, provided with cocks *i*, for regulating the supply.

The vapours, on leaving the nozzle of the apparatus *a*, take the course pointed out by the arrows, passing alternately over and under the partitions *g*, until they arrive at the outlet-pipe *k*, leading to the chimney *l*. In their passage through the case *e*, the vapours are acted upon by the water, which descends in showers from the trough *h*, through the filtering materials, into the receiving pool beneath, carrying down with it all the heavy matters contained in the vapours, or that have been deposited by them.

The patentee claims, as his invention, the application of an exhausting and forcing apparatus to increase the draught in the flues of smelting and other furnaces, and to drive the vapours rapidly through filters of the above or any other suitable descriptions, for the purpose of purifying such vapours, and recovering therefrom any useful matters which may be intermixed therewith.—[*Inrolled in the Inrolment Office, January,* 1846.]

To LAURA LAUGHTON, *late of Plymouth Grove road, Manchester, but now of Everton, in the county of Nottingham, the wife of Edmund Laughton, of the same place, Gent., for certain improvements in the manufacture of soap.*—[Sealed 6th November, 1845.]

THIS invention consists in combining with soap, which has been made in the ordinary manner, a solution prepared from quick lime, fullers' earth, and water.

The mode of preparing the solution is as follows:—Upon one pound of quick lime, two gallons of cold rain water are poured, and, after standing for about twelve hours, the clear lime water is drawn off; then, on four ounces of fullers' earth, two gallons of boiling rain water are poured, and the two solutions are mixed together. One pint of the combined solutions is added to each pound of soap, when in a melted state, and thoroughly combined therewith by stirring; when cool, the mixture is fit for use.

The patentee does not confine herself to the particular quantities above mentioned, so long as quick lime, fullers' earth, and water, are combined with soap, as above described. —[*Inrolled in the Inrolment Office, February*, 1846.]

To JOHN MASTERS, *of Welford-place, Leicester, in the county of Leicester, Gent., for certain improvements in trouser-fastenings, and in attaching the same; and also in the application of an elastic material or fabric to trousers and other articles of dress.*—[Sealed 31st May, 1845.]

THE first part of this invention consists in a peculiar method of securing trouser-straps, and in making certain additions thereto for that purpose. To the bottom of each leg of the trousers, on the inside, is attached a pair of eye-plates, of the form represented at figs. 1, and 2, Plate VIII.; fig. 1, being a plan view of an eye-plate, when first stamped out of sheet metal; and fig. 2, exhibits the same, connected to the leg of the trousers, after the part *a*, has been bent at an angle to the part *b*, on the line 1, 2. The part *a*, has an eye or opening *c*, in it, to receive a spring-hook or catch, hereafter described; and the part *b*, is cut away in a suitable manner at *d*, to admit of the plate being made fast to two buttons, sewn to the trousers, which is done as follows:—The eye-plate is first attached to one button, by passing the shank or holding thread through the vertical part of the opening *d*, and pushing the button to one side of the opening; then, by a repetition of the operation, the other button is made to occupy the opposite side of the opening; and thus the plate is firmly secured to the trousers. A hook-plate, of the form shewn at fig. 3, is fastened to each end of the trouser-strap, by inserting the projections *e, e,* through holes in the strap, and clenching their ends; the part *f*, of the hook-plate, is doubled over at *f**, and acts as a spring-hook or catch, which, being pressed into the eye *c*, is held fast therein by the shoulders *g, g*: fig. 4, shews the eye-plate and hook-plate connected together. The strap is unfastened by pressing on the part *f*, and withdrawing it from the eye *c*.

The second part of this invention consists in a mode of connecting braces together, so as to supersede the common plan of wearing them crossed over each other. The patentee laces them together at the back, using a lace similar to a stay-lace, and making three or four eyelet-holes for its reception along the edge of each brace, commencing about two inches above the button-hole, and keeping the holes about an inch apart.

The third part of this invention consists in the application of an elastic material or fabric to trousers and waistcoats. With regard to trousers, a piece of elastic fabric, of the shape represented at *h*, fig. 5, is let into the back part; preference being given to those fabrics which are rendered elastic or increased in elasticity by being made wholly or partly of caoutchouc, or a preparation of caoutchouc, or gutta-percha, or a preparation of gutta-percha. Elastic pieces, of a similar shape, are applied to waistcoats, being inserted in each side, between the front and back parts, and extending from the bottom of the waistcoat up to the arm-hole; or, instead of these pieces, an elastic connector is introduced, consisting of two vertical strips of cloth or other suitable material, stitched at their outer edges to the front and back parts of the waistcoat, and furnished with eyelet-holes at their inner edges, in order that they may be laced together by means of an elastic cord, made wholly or partly of caoutchouc, or a preparation of caoutchouc, or gutta-percha, or a preparation of gutta-percha. A band of the same description as the elastic connector may be applied to the backs of waistcoats, in order to give elasticity to the same.

The last part of this invention consists in making gloves elastic at those parts which are most liable to strain, and where they usually first give way, and become out of shape. This is effected by forming the "fourchettes" and "quirks" of some elastic fabric, preferring fabrics made wholly or partly of caoutchouc, or gutta-percha, or a preparation of either of them.

The patentee claims, Firstly,—the improvements in trouser-fastenings, and in attaching the same, represented at figs. 1, to 4, inclusive. Secondly,—the manufacture of braces connected at the back by laces, as described. Thirdly,—the application of elastic pieces to trousers and waistcoats, as described. And Fourthly,—using, in the manufacture of gloves, in place of fourchettes and quirks of the same material as the rest of the glove, some elastic fabric, such as above described.—[*Inrolled in the Inrolment Office, November,* 1845.]

To GEORGE BROWN, *of Caperthorne, in the county of Chester, land agent, for a new seed and manure drill plough.*—[Sealed 9th August, 1845.]

THIS invention refers to a novel arrangement of apparatus for ploughing land, depositing guano, bone-dust, or other portable manure, and also for depositing seed, at one operation.

The improvements consist, firstly, in so constructing or forming the plough into parts, (that is, so dividing, arranging, and setting the share of the plough,) that when drawn through the land it shall form the ridge by throwing the soil inwards towards the centre of the machine, instead of outwards, as in the ploughs now commonly used; and secondly, in placing manure and seed-boxes in the centre of the machine, that is, in a line exactly over the centre of the furrow.

In Plate IX., fig. 1, represents the drill plough in side elevation; fig. 2, is a plan or top view of the same; and fig. 3, is a longitudinal section, taken vertically through the centre of the machine, in the line A, B, of fig. 2. The general frame-work and driving-handles are represented at *a, a, a, a*; the draught-bolt or swivel at *b*; the running-wheels at *c, c*; the plough-share or mould-board at *d, d*; the manure-box or hopper at *e*; and the seed-box at *f*, with its delivering-spout or funnel *g*. Such being the principal arrangement of the improved drill plough, its operation will be readily understood. As the plough is drawn forward through the land, it will be seen that, by the peculiar set or arrangement of the double plough-share *d, d,* as shewn best at fig. 2, the soil will be thrown inwards towards the centre, and thus the furrow will be formed immediately under the centre of the manure and seed-boxes. Upon the shaft *h,* of the larger pair of running-wheels *c, c,* there is a small toothed-wheel *i,* which, being actuated by the rotation of the running-wheels, will, through the carrier-pinions *k, k,* communicate rotary motion to the distributing-roller *l,* in the manure-box, and deliver manure along the trough *m,* into the furrow, and also give rotary motion to the seed-box *f,* which will thus also deliver the seed or grain as required. A sliding-catch *n,* and hand-lever *o,* is provided, for the purpose of throwing the driving-wheel *i,* out of gear with the manure and seed-boxes, when requisite.

The patentee remarks, in conclusion, that any necessary change may be made, either in the forms or capacities of the seed or manure-boxes or hoppers, according to the quality of the seed or grain to be sown; and that in sowing turnip or other small seeds a small roller should be attached, to follow the seed as it is sown. He further states, that if beans are to be sown, the small seed-box must be removed, and a large seed-hopper introduced in its place, and seed-cups or delivering-wheels be put in place of the rotary seed-boxes.—[*Inrolled in the Petty Bag Office, August,* 1845.]

Specification drawn by Messrs. Newton and Son.

To William Longmaid, *of the borough of Plymouth, in the county of Devon, Gent., for improvements in the manufacture of chlorine, in treating sulphurous ores, and other minerals, and in obtaining various products therefrom.*—[Sealed 4th August, 1845.]

This invention relates to the manufacture of chlorine from iron pyrites or other sulphurous ores, common salt, and oxygen, and from various metallic chlorides and oxygen.

In decomposing common salt by the joint action of iron pyrites or other sulphurous ores, oxygen, (obtained from atmospheric air) and heat, as described in the specifications of patents obtained by the present patentee, October 20, 1842, and January 4, 1844*, the chlorine of the salt is disengaged, and combines with the metals contained in the ores, forming the chlorides of such metals; and the patentee has discovered that, by continuing the calcination, the metals of certain chlorides become oxidized with the evolution of chlorine. To obtain the chlorine thus disengaged, the mixture of ore and salt is calcined in an open furnace, as described in the first specification, until sulphuric acid ceases to be evolved; the charge is then withdrawn, and put into a close furnace (provided with apparatus for forcing in dry atmospheric air, and collecting the chlorine), in which the calcination is continued until the evolution of chlorine ceases;—the relative proportions of ore and salt will depend upon the amount of sulphur in the ore; but the mixture must contain from 35 to 40 parts of sulphur to 100 parts of salt.

The patentee has also discovered that various metallic chlorides, such as those of iron and manganese, when heated in contact with dry atmospheric air, are decomposed, and chlorine is evolved, by the oxygen of the air combining with the metals, and forming oxides of such metals.

When metallic oxides, particularly those of manganese, copper, zinc, and lead, are mixed with hydrochloric acid, the residual matters contain chlorides of such metals,—these the patentee proposes to dry and employ for obtaining chlorine, by oxidizing the metals of such chlorides with dry atmospheric air.

Dry atmospheric air must be used in all these cases, as otherwise the moisture usually contained in the air becomes decomposed, and the hydrogen of the water combining with a portion of the chlorine forms hydrochloric acid.

The close furnace, above mentioned, is of a rectangular form, 20 feet long and 7 feet wide in the clear; the chamber of the furnace is as nearly air-tight as possible, and there are doors in the sides for charging and stirring the charge; the flues from the fire-place are conducted over and under the chamber into a flue connected with a chimney. A rotary fan or blower is connected with the chamber of the furnace (termed the chlorine generator,) for the purpose of forcing in air, which is distributed over the interior of the generator by a series of small tubes; the air having been previously deprived of moisture by passing through a chamber nearly filled with pieces of coke, or other suitable material, on which a layer of chloride of calcium is placed—when metallic chlorides are operated upon, the air-tubes are placed over the top of the generator, in order that the air may be heated before it enters the generator. The gases evolved pass from the generator through tubes or flues into a chlorine purifier, consisting of a flue 40 feet long and 1 foot square, made of deal boards 1 inch thick; it is immersed in water, which, penetrating through, keeps the inner surface of the flue in a wet state; a waste-pipe being inserted at the further end, so that only a thin stratum of water may remain at the bottom of the flue. If, on putting a charge into the generator, sulphurous acid gas is found to come over, the communication with the purifier is shut off, and the vapours allowed to pass into the chimney, until sulphurous acid gas is no longer detected, and then the vapours are permitted to proceed to the purifier. To condense any moisture, hydrochloric acid, or other matter that may be accidentally evolved from the generator, a leaden flue (9 inches in diameter) is applied to the end of the wooden flue, rising to the height of 10 feet, and then descending 10 feet. The end of this flue dips into water in an open cistern, and a branch-pipe proceeds from the lower part of the descending flue into the chamber wherein the chlorine is condensed or used for the ordinary purposes of manufacture. The chlorine thus obtained is mixed with an excess of atmospheric air, nitrogen, or other matters, which are allowed to escape through a leaden eduction pipe (2 inches in diameter and 10 feet high) attached to the top of the condensing chamber.

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* For descriptions of these Inventions see Vol. XXIV., p. 274, and Vol. XXV., p. 22.

The patentee claims, Firstly,—the manufacture of chlorine by the calcination of a mixture of iron pyrites or other sulphurous ores and common salt, with access of atmospheric air deprived of moisture. Secondly,—the manufacture of chlorine by oxidizing metallic chlorides, such as manganese, copper, iron, zinc, and lead, by access of atmospheric air deprived of moisture, thereby producing chlorine and the oxides of such metals.—[*Inrolled in the Inrolment Office, February,* 1846.]

To JOHN BRUMWELL GREGSON, *of Dunston, in the county of Durham, manufacturing chemist, for improvements in the manufacture of Epsom salts and carbonate of lime, commonly called precipitated chalk; parts of which improvements are applicable to other purposes.*—[Sealed 10th February, 1845.]

THESE improvements in the manufacture of Epsom salts are two in number; and consist, firstly, in the application of sulphuric acid to dolomite or magnesian limestone in the uncalcined state; and, secondly, in the application of muriate of ammonia to remove the lime from the mixed hydrates of lime and magnesia, obtained by thoroughly calcining and slaking dolomite.

The following is the mode of carrying out the first improvement:—The dolomite is reduced to powder, and made into a paste with water, in an open vessel lined with lead; then sulphuric acid, of 1·500 sp. gr., is added, in the proportion of 350 lbs. of the latter to 200 lbs. of the former, and the mixture is well stirred. The sulphuric acid rapidly decomposes the dolomite, and carbonic acid gas is liberated; and when the effervescence ceases a solid substance remains, composed of the sulphates of lime and magnesia;—if desired, the carbonic acid gas may be collected for use, by mixing the sulphuric acid and dolomite in a close vessel. The mixed sulphates are separated by diffusing the solid residuum in water, allowing the sulphate of lime to subside, and drawing off the supernatant liquid, which is a solution of sulphate of magnesia (Epsom salts), containing a small quantity of sulphate of iron; this solution is freed from sulphate of iron by means of caustic lime or magnesia, and is evaporated and crystallized in the usual way. Or the mixed sulphates may be calcined in a reverberatory furnace for three or four hours, or until the whole of the iron is peroxidized; and, when this has been done, the sulphate of magnesia may be dissolved out of the mass, and the clear solution evaporated and crystallized.

The method of operating according to the second improvement is as follows:—200 lbs. of muriate of ammonia are dissolved in 100 gallons of water, in an iron boiler, by the application of heat, and the solution is allowed to cool; after which 200 lbs. of thoroughly calcined dolomite are slaked with water, and put into an iron still (holding from 300 to 400 gallons), connected with a Woolf's apparatus containing water; the solution of muriate of ammonia is then introduced, and a gentle heat applied to expel the ammonia, which is condensed in the Woolf's apparatus, and stored for use. When all the ammonia has come over, the residuum is withdrawn from the still, and the hydrate of magnesia thoroughly washed, to free it from muriate of lime. The magnesia is then saturated with sulphuric acid; the iron it contains is thrown down, by means of caustic lime or magnesia; and the clear solution is evaporated and crystallized.

The improvements in the manufacture of carbonate of lime consist, firstly, in the application of carbonic acid gas to a solution of caustic ammonia and muriate of lime,—and in the recovery of the muriate of ammonia for subsequent use; and secondly, in adding a solution of carbonate of ammonia (obtained by saturating a solution of caustic ammonia with carbonic acid gas), to a solution of muriate of lime.

With regard to the first improvement, the operation is conducted in the following manner:—100 lbs. of muriate of ammonia are dissolved in 100 gallons of water, and the solution allowed to cool; 70 lbs. of well-burnt lime are then slaked in water, and, when cold, stirred into the solution of muriate of ammonia, in an earthenware vessel; mutual decomposition immediately takes place, and muriate of lime and caustic ammonia are formed in the liquid. This solution is transferred to a cylindrical vessel, lined with lead, and containing an agitator, covered with lead; carbonic acid gas is then forced into the solution, by means of a force-pump connected with the bottom of the vessel, and the agitator is kept revolving until the solution is entirely decomposed, which may be known by the smell of ammonia no longer arising. The vessel will now contain a milky fluid, composed of carbonate of lime and a solution of muriate of ammonia; this fluid is removed, and allowed to settle; the clear solution of muriate of ammonia is then decanted off, and the precipitated chalk well washed and dried. The solution of muriate of ammonia may be again used.

The mode of carrying into effect the second improvement in the manufacture of carbonate of lime is as follows:—100 gallons of a solution of caustic ammonia, of 0·970 sp. gr., are introduced into a vessel, similar to that last described, and capable of holding 120 gallons; carbonic acid gas is then forced in, and the solution becomes thereby converted into a solution of bicarbonate of ammonia, which is run into a cistern containing 100 gallons of a solution of caustic ammonia, of the same specific gravity; and a solution of carbonate of ammonia, of 1·050 sp. gr., is thus produced. This is mixed with a solution of muriate of lime, of 1·200 sp. gr., in the proportion of two parts of the former to one of the latter; decomposition immediately takes place, and the whole becomes a gelatinous mass, which must be stirred until the carbonate of lime assumes the solid form. The mass is then allowed to subside; the clear solution of muriate of ammonia is drawn off; and the carbonate of lime is washed and dried.

The patentee, claims, Firstly,—the application of sulphuric acid to raw or uncalcined dolomite or magnesian limestone, for the purpose of making sulphate of magnesia or Epsom salts; and the modification of the process, in order to obtain also therefrom a quantity of carbonic acid gas, available for other purposes. Secondly,—the employment, in the manufacture of Epsom salts, of muriate of ammonia or sal-ammoniac, to remove the lime from the mixed hydrates of lime and magnesia; and the recovery of the ammonia by distillation, and separation thereby of the lime from the magnesia contained in magnesian limestone, whether the residual magnesia is applied to the manufacture of Epsom salts, or of any other salt. Thirdly,—the manufacture of carbonate of lime or precipitated chalk by the application of carbonic acid gas to a solution of caustic ammonia and muriate of lime; and the recovery of the muriate of ammonia for subsequent use. Fourthly,—the application, in the manufacture of carbonate of lime or precipitated chalk, of a solution of carbonate of ammonia (obtained by saturating a solution of caustic ammonia with carbonic acid gas) to a solution of muriate of lime, as above described.—[*Inrolled in the Inrolment Office, August,* 1845.]

To JOHN FIELD, jun., *of West Brixton, in the county of Surrey, Gent., for improvements in apparatus for ascertaining the alcoholic strength of liquids,—being a communication.*—[Sealed 23rd June, 1845.]

IN order to ascertain the alcoholic strength of liquids, it has been the practice to employ instruments which indicate the specific gravity of the liquids, and such instruments determine the alcoholic strength with considerable accuracy, when water only is mixed with the alcohol; but should the specific gravity of the liquid be interfered with by the addition of sugar or other matter, then these instruments are not to be depended upon; for if a comparatively small quantity of sugar be dissolved in water containing alcohol, the ordinary instruments will give no indication of alcohol. It is well known that the temperature at which liquids containing alcohol begin to boil depends upon the quantity of alcohol in the mixture, and is not materially affected by the presence of sugar or other salt or matter which changes the specific gravity of the liquid; the patentee, therefore, takes advantage of this circumstance, and employs a thermometric apparatus for ascertaining the alcoholic strength of liquids.

In Plate VIII., fig. 1, is a front view, and fig. 2, a vertical section of the apparatus employed. *a*, is a spirit lamp, to be supplied with alcohol of 85° strength; it is placed in a vessel *b*, which supports a vessel *c*, for holding water, and a vessel *d*, to be filled with the liquid that is to be tested. The thermometric apparatus consists of a glass bulb *e*, containing quicksilver, with a tube e^1, rising from it, in which a float *f*, rises and falls; the float (shewn in section, on an enlarged scale, at fig. 3,) consists of a glass tube *f*, containing quicksilver, having its upper end hermetically sealed, and fixed in a short metal tube *g*, attached by a fine silk cord to a double pulley on the spindle *h*; to this pulley a counterbalance weight *i*, is also connected, being suitably adjusted for causing the hand *j*, on the spindle *h*, to stand in the position represented at fig. 1, when the instrument is not in use. *k*, is a graduated scale, upon which, when the liquid boils, the hand *j*, points out its alcoholic strength: the zero mark on the scale indicates the boiling point of distilled water; the graduations 1 to 60 indicate the degrees of strength of alcoholic liquids, which are obtained, in the first instance, by successively increasing the alcohol in measured quantities, and marking the places to which the hand *j*, points, when the respective known mixtures begin to boil.

The mode of using the apparatus is as follows:—Water is poured into the vessel *c*; the vessel *d*, is filled with the liquid to be tested, and covered over; and the lamp *a*, is lighted. Now, supposing the liquid in the vessel *d*, to be of 60° strength, when it comes to the boiling point, the hand *j*, will only have moved from its resting place to 60 on the scale *k*; or if the strength be 50°, the hand will have moved to 50, and so on for other degrees of strength; if the hand comes to zero, it indicates that the liquid does not contain any alcohol.

The patentee claims the so arranging of thermometric apparatus as to indicate the alcoholic strength of liquids, when the same are raised to the boiling point.—*Inrolled in Inrolment Office, December,* 1845.]

To RICHARD ARCHIBALD BROOMAN, *of* 166, *Fleet-street, in the city of London, Gent., for certain improvements in machinery for weaving,—being a communication.*—[Sealed 18th June, 1845.]

IN Plate VII., fig. 1, is a top plan of half a loom, constructed according to this invention; and fig. 2, is an elevation of the same, with a part in section, taken on the line A, B, C, D, of fig. 1. The loom consists of two parts, an upper (A^1, A^1,) and an under (B, B,), mounted on one common vertical shaft X; the former of which is fixed or stationary, and the latter moveable. The part A^1, A^1, is made fast to the shaft X, by means of the screw *a*, and consists of a broad circular ring of cast-iron, with six radial arms; to the upper face of which ring the brass plates *b*, *b*, are attached, by means of screws *c*, *c*. Each quarter of the ring carries one entire set of those parts by which the weaving is immediately effected; these parts are supported by the plates *b*, *b*, and consist, first, of a feed-wheel *d*; second, a presser-wheel *f*; third, a sinker-bar *g*; fourth, a sinker-wheel *h*; and fifth, a wheel *i*, for pressing back the work. The under part B, B, is also circular and of cast-iron, and is provided with the same number of radial arms; it is free to revolve on the same shaft as that to which the upper part A^1, A^1, is attached. It has fixed to it a horizontal toothed-wheel *j*, and also a circular brass ring *k*, which is composed of two separate pieces, one placed on the top of the other; between which the needles *l*, *l*, which are made of steel, are securely held by the screws *m*. The periphery of the under part of the loom is of a conical form, and it is surrounded with a comb-plate, composed of a series of small plates *n*, *n*, being similar to that employed in the common weaving loom.

The loom is actuated by the handle O, on the outer end of the axis *p*, which carries a pinion *q*, in gear with the teeth of the horizontal wheel *j*, which takes around with it the under part B, B, to which it is fixed. The working parts of the apparatus being thus set in motion, the feed-wheel *d*, takes the thread as it unwinds from the bobbins *r*, *r*, and transfers it to the needles. The oblique position of this wheel, of which a detailed description will be hereinafter given, is intended to enable it, in the first instance, to lay the threads on the body of the needles, and make them afterwards pass under the barbs. A disc e^2, presses the comb-plates *n*, *n*, inwards towards the periphery of the under part B, B, to prevent them from interfering with the action of the feed-wheel *d*, and also to prevent the needles from yielding when they are required to take up the threads. When the needles have received the thread from the feed-wheel *d*, they come under the presser-wheel *f*, which presses down the barbs, and thus allows the loop formed in the preceding round (when there has been such a preceding round) to escape from the needles. Notches or spaces e^1, e^1, may be cut out of the circumference of the presser-wheel, as shewn at f^2; in which case a double loop will be formed, by reason of the wheel not pressing on those needles which come immediately under such spaces. The number and position of these spaces may be calculated so as to produce different and regular patterns in the web: and there may be an assortment of such wheels, adapted to various patterns, kept ready mounted on a radial frame M, so that one may be substituted for another, as required. The sinker-bar *g*, serves to push the comb-plates towards the outer periphery of the loom, and, consequently, to withdraw the thread from the needles, after having been placed there by the feed-wheel *d*. This bar is composed of two parts, connected together by a screw *y*; one of these parts *s*, is stationary, and the other *t*, is moveable round the screw *y*, so as to allow of the bar being drawn back towards the exterior of the loom, according as a greater or less depression is required to be given. The drawing back is effected by acting on the presser-bar *g*, by the screw W, in the bar Y. The sinker-wheel *h*, serves to press down such loops as may not have been freed from the needles by the sinker-bar, while the spring o^1, in front of this wheel, causes the plates *n*, *n*, to move back into their places, out of the way. The wheel *i*, pushes back the comb-plates *n*, *n*, as well as the work, against the exterior face of the periphery, so as to allow the feed-wheel *d*, to pass clear in the following course;—the feed-wheel *d*, may be made either with moveable or with fixed teeth. Fig. 3, is an elevation of this wheel, as fitted in its place in the loom. It consists of two parts, A^1, and B^1: the one part, A^1, is fixed, while the other part, B^1, is free to move round on an axis C^1. The part B^1, includes the feed-wheel G^1, properly so considered, and a guide-wheel E^1; the two being united by an intermediate cylinder D^1. The fixed part A^1, consists of a brass plate, into which a steel plate is inlaid, having an excentric groove F, F, cut in it, as shewn at fig 5. The moveable part B^1, is furnished with teeth, composed of small steel blades or strips G, furnished with projecting studs g^1, g^1, see fig. 3*, which exhibits a detached view of one of these blades. These teeth are placed obliquely in slots or sockets made for their reception, as shewn in figs. 3, and 4, When the parts A^1, and G^1, are united face to face, the studs g^1, take into the excentric groove F, and, on the wheel rotating, the teeth necessarily follow in the direction of the groove, whereby they are made to protrude sufficiently to lay hold of the thread, and pass it under the barbs of the needles, while, as soon as the thread has been so taken hold of, the action of the excentric causes them to recede into the interior of the wheel.

A feed-wheel, with fixed teeth, is represented in figs. 6, and 7; fig. 6, being an elevation of this wheel, and fig. 7, a section of the same, in the line A, B, of fig. 6. It consists of a feed-wheel O^1, and of a guide-wheel P^1, both mounted on one shaft Q^1. The wheel O^1, consists of a brass disc R^1, in which are fitted the steel teeth S, furnished with projecting studs S^1. This disc R^1, is enclosed between two iron plates T, T^1, and all three are tightly bound together by means of a nut and screw U. The guide-wheel P^1, is secured in the same way to the opposite end of the shaft. The moveable tooth-wheel is superior to the wheel with fixed teeth, inasmuch as but few of the teeth are protruded at a time; and, by means of the excentric, much finer as well as much coarser yarns can be used than with the ordinary wheel. But, on the other hand, the fixed tooth-wheel offers this considerable advantage, that the teeth can be replaced or repaired, in case of accident, with great facility, by simply turning the nut U, and removing the iron plate T^1.

The patentee claims, First,—the peculiar system of mechanism formed by the combination and employment, in manner before described, of the parts marked *d*, *f*, *g*, *h*, and *i*. Second, —the feed-wheel *d*, of either of the varieties before described, whether employed as part of the said system of mechanism, or as part of any other combination for weaving looped fabrics. Third,—the employment of presser-wheels *(f,)* varied in the circumference thereof, as before described, so as to produce work of various patterns. Fourth,—the application of comb-pieces, of the ordinary form before described, to the weaving of looped fabrics. And Fifth,—the employment of steel needles in the weaving of looped fabrics, as before described. —[*Inrolled in the Inrolment Office, December*, 1845.]

To Michel Perrier, *of Lymington, in the county of Hants., Gent., for improvements in spinning and twisting cotton, flax, silk, and other fibrous materials,—being a communication.*—[Sealed 21st July, 1845.]

This invention consists in a mode of actuating the bobbins of spinning machinery, and causing them to give motion to the spindles thereof.

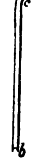
In Plate VIII., fig. 1, is an elevation of one end of a spinning machine. *a*, *a*, is the framing of the machine; *b*, *b*, are the spindles; and *c*, *c*, are the bobbins. Each spindle passes through a tube *d*, (shewn separately at fig. 2,) affixed to the cross-bar or rail *e*; beneath this rail is another rail *f*, capable of movement up and down, according to the ordinary plan, and carrying the sockets *g*, *g*, wherein the spindles revolve;—the sockets are adjusted, in order to regulate the height of the flyers, by means of the screws *h*, *h*. At each end of the rail *f*, an upright rod *i*, is fixed, which passes through and is guided by the rail *e*, and bracket *j*; the upper ends of the rods being connected together by a cross-bar *k*, situated over the top of the spindles. Guides *l*, *l**, conduct the thread to the flyers *b**, *b**, which can be raised upon their hinges (as represented at *l**,) when the bobbins and spindles are required to be removed; the guide-carriers are raised or lowered according to the movement communicated to the rail *f*. Round the tube *d*, a pulley *m*, turns freely, having a small hook *n*, that catches against a stop on the lower end of the bobbin (shewn at *o*, in fig. 3, which is a plan view of the under side of the bobbin,) and carries the latter round with it; the pulley *m*, receiving motion through an endless band from the large cylinder or drum of the machine. The bobbin turns the spindle by means of the yarn, which comes from the drawing-rollers to the bobbin through the guide *l*, and the eye of the flyer; and the yarn becomes twisted by the difference in speed between the bobbin and spindle.

The patentee does not confine himself to the precise details, but claims the mode of giving motion to the bobbin from the main cylinder, so that the bobbin turns the flyer, as above described.—[*Inrolled in the Inrolment Office, January,* 1846.]

To WILLIAM TINDALL, *of Cornhill, in the City of London, ship-owner, for certain improvements in the manufacture of candles.*—[Sealed 11th April, 1843.]

THIS invention consists in a peculiar mode of applying plaited wicks to candles, by means of a flat metal rod, wire, or instrument; the object being to make candles with double wicks, which will turn from the centre whilst burning, and be consumed without requiring any snuffing.

It is well known that the lighted end of an ordinary plaited wick bends over upon that side in which the strands run upwards from the outer edges to the centre; whilst, on the opposite side of the wick the same strands will be found to run upwards from the centre to the outer edges; the patentee takes advantage of this circumstance, and arranges the wicks accordingly upon the instrument employed for inserting them into candles. The ordinary plaited wicks may be used; and the instrument may be made in any manner that will answer the purpose. The instrument used by the patentee is represented in the margin; it is a thin narrow rod of steel, brass, or other metal, rather longer than the candle intended to be made, having two flat sides, with a handle at one end, and a notch at the other. The following is the mode of employing the instrument:—The plaited wick is first placed against one side of the instrument, commencing near the handle *a*, in such a manner that the strands on that side of the wick which comes next the instrument shall run upwards (towards the notch *b*,) from the centre of the wick to the outer edges; the wick is carried up to the notch, and then twisted or turned half round; which



twisting or turning enables the operator to conduct the wick from the notch, along the opposite side of the instrument, with the strands on that side of the wick which comes next the instrument running upwards from the centre to the outer edges, in the same manner as the strands on the other side. Both ends of the wick being then fastened, by thread or other means, to the instrument at *c*, it is ready to be placed in the candle mould.

The twist or half turn at the notch might be dispensed with, by cutting the plait at the notch, and carefully laying the plait on the opposite side of the instrument, in the manner before described; but by so doing some difficulty and uncertainty might arise in the manufacture of the candles.

The patentee claims the manner and method of applying, placing, and fixing upon and against the instrument, above described, plaited wicks, with the said twist or half turn therein at the notch of such instrument, and by cutting such wicks at the notch, as before mentioned, or by either of such methods, and the candles manufactured with plaited wicks applied in that manner.—[*Inrolled in the Inrolment Office, September*, 1843.]

To ALANSON ABBE, *of Great Russell-street, Bloomsbury, in the county of Middlesex, M.D., for improvements in apparatus for preventing and alleviating spinal disorders.*—[Sealed 4th August, 1845.]

THE object of the present invention is the construction of an instrument or apparatus which, when applied to the human body, will very considerably assist in supporting the same, and thereby prevent fatigue; the apparatus is also calculated to prevent the spine of persons of weakly constitution from becoming distorted by over fatigue or other causes; and it may also be employed for correcting or alleviating distortions which frequently arise from inattention or other causes. The patentee remarks, that various instruments or apparatus have, from time to time, been invented for the purpose of curing spinal affections; but, as far as his experience has gone, he considers these instruments to have been constructed on erroneous principles, and therefore unsuitable for accomplishing the desired effect.

The plans hitherto adopted to cure spinal affections consist in casing the body in a nearly rigid frame, and in supporting that part of the body which is weak. Now it is well known, that if the muscles and tendons of the body are not allowed to act they will very soon lose their muscular power, and fail to act and maintain the body, or the different parts of the body, in their proper and upright positions. By the employment of a rigid frame, the object which it is sought to effect, namely, the straightening and strengthening these parts, is said to be defeated, and the contrary result obtained.

By the peculiar construction of his improved apparatus, the patentee states, that he is enabled to straighten the distorted parts of the body, and call into action the muscles connected therewith, without much interfering with the freedom of action of the wearer, so that a person who is not in any way distorted in figure may, without inconvenience, wear one of these instruments, which will be found a very great relief and assistance to any one whose avocations require that they should remain standing for any considerable length of time; every facility being given for the natural movements of the body, such as bending backwards and forwards, or sideways, or moving the arms in any direction; and as it will always require some slight degree of muscular exertion to overcome the elasticity of the various parts of the apparatus, it follows, that whenever any movement is made, the apparatus will always tend to bring the parts into a quiescent position again; and this continual action of the muscles against the elastic power of the instrument will tend greatly to strengthen them, without at all fatiguing the wearer when engaged in ordinary avocations.

The improved instrument consists of two or more distinct elastic framings, made of metal, wood, whalebone, or other analogous elastic material. Of these framings, when two only are employed, the upper one is made to embrace the body or back, and the lower one the hips, and they are connected together by a joint, which allows the body to bend over on either side. These framings are further connected together by means of elastic webbing, or any other convenient and suitable elastic material, on either side of the joint, so as to maintain, or tend to maintain, the framing and the body in an upright position.

In Plate IX., are various views of stays or corslets for the back, constructed according to this invention, and intended both for the use of persons having distorted spines, as well as for those who from weakness require some vertical support. Fig. 1, represents a view of the outer side of the instrument or apparatus; and fig. 2, a similar view of the inner side, or that which comes against the body Fig. 3, represents the skeleton frame, before any of the covering is added, and which is composed of two distinct framings, A, and B, connected together by means of a tongue *b*, jointed to the upper frame at *a*; this tongue *b*, slides into a socket made in the lower frame at *c*, and is firmly held therein by means of a pin or stud fixed on the inner side of the spring *d*, which, when it is required to detach the two framings, may be pushed on one side, as it turns on a stud below. The pin, at the upper end of the spring, enters into a corresponding hole made in the tongue-piece *b*, for that purpose, and thereby firmly retains it in its place until the pin is removed, by pushing the spring *d*, on one side, as above mentioned. The joint *a*, allows the upper frame to be moved over on either side, according to the inclination of the body; but as the two framings are further connected together by an elastic webbing *e*, *e*, which may be made of any strength, the tendency of the webbing will always be to pull the framing back again into its proper position, when forcibly stretched over or extended by a movement of the body. It will, therefore, be understood, that if the spine is distorted, so as to force the framing out of an upright position, the elastic webbing will be constantly exerting a feeble force to draw the spine into its proper position; this continuous strain will, though but of slight power, have a much greater and more beneficial effect than a greater power acting periodically, or from time to time. The apparatus is of course applied to the back (the middle straight bar, with its joint *a*, representing the vertebræ), and is made of thin steel, in order to give a proper degree of elasticity, so as to allow the body to bend forward with ease. The front part of the instrument is furnished with straps or bands, of an elastic material, and intended to embrace the chest and abdomen: these straps are furnished with holes and laces, so as to admit of their being laced up, in order to make the corset fit or attach itself closely to the figure behind. This object is further effected by means of the elastic arm-straps *g*, *g*, which allow the arms to be brought forward without inconvenience or restraint, and always keep the corset in close contact with the back. The framing may be covered over with a platted fabric (as seen in the figures) or any other suitable fabric; but care must be taken to fix the fabric firmly to the centre bar, in order to preserve its form, and prevent it from altering: this object, in the present instance, is effected by making a long slit down the centre-bar, as seen in fig. 3, and fastening the platted fabric through this slit; or it may be secured by means of rivets or other fastenings, which will prevent it from getting out of shape.

The elastic webbing *e*, *e*, is not connected directly to the lower or hip-framing B, but to a number of straps *h*, *h*, *h*, furnished with hooks, as seen in figs. 1, and 2. By means of these straps which pass through loops *i*, *i*, *i*, at the lower end, and inside the framing B, (as seen in fig. 2) the tension of the elastic webbing may be increased or diminished on either side by merely hooking the end thereof into the holes *j*, *j*, of the lower framing higher up or lower down. As the spine becomes gradually straightened and made to assume a proper position by means of the improved instrument, it will be necessary, from time to time, to alter the length of the apparatus: this is provided for by the tongue-piece *b*, which may be slidden in or drawn out of its socket in the lower framing, and firmly retained at any particular height by means of the stud in the spring-piece *d*.

It will now be understood, that if the body of a patient bends over to the right of the centre of gravity, the straps *h*, *h*, on the opposite side must be hooked up a hole or two, so as to increase the tension or force of the opposite side, which is thereby continually exerting a force to draw the body back again into its proper position.

Fig. 5, shews another mode of making the elastic connection between the upper and lower framing. In this latter plan, the elastic medium, which may be either of caoutchouc, or metallic spring, or other elastic substance, is connected at one end to one side of the centre-piece, and at the other end to the upper part of the lower framing. By this means a similar effect is obtained, but the first described plan is preferred.

Fig. 6, represents another plan of obtaining the requisite degree of elasticity and lateral resistance in the joint at the lumbar region, which is effected by means of a spiral spring and barrel, connected to this joint, as seen in the drawing. The frame is constructed upon the principle shewn at fig. 1, in all its leading features, with the single addition of a spiral spring placed at the joint F, and so arranged that the force of the spring is made to incline the body either to the right or left, as the case may require: the force of the spring may be varied at pleasure, on the same principle as the main spring in a watch, and held in any desired force by a ratchet, fixed upon the barrel to which the spring is attached. It is obvious that the action of the spring may be reversed, by detaching it from the frame, and turning it round, so that it may be made to act on any curvature of the lower part of the spine.

If the body is thrown to the right side by a curvature effecting the lumbar or dorsal region, and the spiral spring is arranged so as to throw the body to the left, when the muscles moving the body upon the pelvis are in a state of inaction, it is evident that the whole force of the spring is exerted to overcome the deformity, and to bring the body into its normal condition, and yet allows the free action of every muscle.

Fig. 7, represents an instrument which is intended to act upon three curves at once, or, by removing the upper part Y, it then acts only upon two curves, viz., the lumbar and dorsal curves; but with the additional apparatus Y, the lumbar, dorsal, and cervical curves, are acted upon at the same time by the elastic forces K, K, and varied in each portion, as the particular circumstances of each case may require. The action between the parts E, and H, is the same as described in fig. 4, and the application is the same. The action between H, and M, is precisely the same in principle. The action between M, and Y, is also the same. If the instrument be applied to a case of three curves, the part E, is secured to the hips *a*;—then the part H, is secured to the waist, or rather the lower part of the dorsal region, embracing the lower part of the chest. Now, if the elastic force of the left side (the instrument being applied to the back) be increased to a sufficient degree to straighten the dorsal curve, the whole body above that portion will be carried to the left of the centre of gravity; consequently the muscles acting upon the dorsal and cervical curves will be brought into vigorous action to maintain the centre of gravity, and, by doing so, will powerfully aid the restoration of these curves, which are usually secondary. But to aid and greatly facilitate the operation of the natural action of the muscles, thus vigorously brought into action, the elastic force between H, and M, is introduced, and, by increasing the elastic force on the right side so as to preponderate over the elastic force of the left, the muscles are aided in their efforts at restoration, just in proportion to the degree which the right elastic force exceeds that on the left, so that the force of the muscles, and the unequal elastic force, is brought to bear directly upon the dorsal curve, the effect of which is to throw the head to the right, past the centre of its gravity. Here again precisely the same effects and results are obtained. The elastic force between M, and Y, on the left side must be increased in its force beyond the right side, and the muscles are aided in restoring the cervical curve. Each of these joints P, O, and F, may be operated upon by a spiral spring, as at F, in fig. 6, or any other known arrangement of a spring may be made to produce the same result.

In all these arrangements the principle is the same, viz., to act upon any part of the body by an elastic force, which, at the same time that the elastic force is exerted, allows the muscles to act freely.

By varying the form of apparatus the principle is applicable to all parts of the body, and all forms of distortion.

It is preferred that the upper part Y, of the frame should be constructed in such a manner that it may be easily detached, and removed entirely from the frame if required; this object may be effected by constructing it upon the plan shewn in figs. 1, and 2.

The patentee does not confine himself to the precise arrangement of parts above shewn and described, as other means may be devised to effect the purpose desired without departing from the nature of the invention.

He claims, First,—the employment of two or more principal parts or frames (two of which A, and B, are connected together by a centre joint, situated in the lumbar region, as shewn in figs. 1, 2, and 3, and the other frame or frames are connected by similar joints, as shewn in figs. 6, and 7,) when applied to the body, and constructed in such a manner as to allow of an anterior and posterior motion of the body. Second,—the employment of elastic substances for further connecting the two principal parts together, so as to create an elastic force that shall be constantly acting on a distorted part, so as to bring it gradually back again to its proper position.—[*Inrolled in the Petty Bag Office, February,* 1846.]

Specification drawn by Messrs. Newton and Son.

To William Gilmour Wilson, *of Earl-street, in the city of London, engineer, for improvements in the construction of wheels for carriages.*—[Sealed 29th April, 1845.]

These improvements in the construction of wheels are represented in Plate IX.; fig. 1, being an elevation of a wheel; fig. 2, a section, on the line 1, 2, of fig. 1; and fig. 3, a section, on the line 3, 4, of fig. 2. *a,* is the nave, formed of plates fastened together by ordinary means, or it may be cast in one or more pieces; the outer side is closed, so that neither the bush *b,* nor the end of the axle *c,* can be seen; on the inner side is a flange *d,* to which a plate *e,* is fastened, and presses against the collar of the axle to keep the axle-arm in the nave and bush; *f, f,* are the spokes, formed of metal tubes, which may be filled with wood, to lessen the sound of the wheel when running, and to strengthen the spokes; *g, g,* are sockets for securing the spokes to the nave *a,* and rim or felloe *h*; they are fastened to the nave and rim by rivets, bolts, screws, or other means. The rim or felloe *h*, is made of wrought iron or other rolled metal, of a hollow form, and in one, two, or more pieces; it may be wholly or partly filled with wood or other strong light substance, so as to lessen the sound of the wheel when running, give stiffness to the rim, and make a suitable bearing or bed for the hoop or tire which forms the wearing part of the wheel. This wood or other substance may also be studded with nails, wedges, or bolts of metal, so as to form the wearing part of the rim, and thus dispense with a hoop or tire.

The patentee claims, Firstly,—the mode of forming the hollow rim or felloe of a wheel by means of wrought iron or other rolled metal. Secondly,—the mode of fixing the spokes to the nave and to the rim or felloe by means of sockets, as described. Thirdly,—the mode of forming the nave, as shewn in the drawings.—[*Inrolled in the Inrolment Office, October,* 1845.]

To HENRY MANDEVILLE MEADE, *of the city of New York, America, for improvements in distilling from Indian corn and other grain,—being a communication.*—[Sealed 18th September, 1845.]

THIS invention consists in distilling Indian corn, combined with rye or other grain, by preparing a wash as hereafter described, and then (instead of drawing off the wash from the grain) submitting the wash with the grain to distillation.

Rye is preferred to be used with the Indian corn, and part of the rye is to be in the state of malt. The wash is prepared in the following manner:—The Indian corn, rye, and rye-malt are reduced, by grinding, to a powder resembling coarse oatmeal; then, supposing the mash-tub to be 12 feet in diameter at bottom and 3 feet deep, with a rake revolving at the rate of 16 revolutions in a minute, water, at 160° Fahr., is run in to the depth of about 5 feet (qy. inches), and 34 bushels of Indian corn meal are introduced slowly, so as not to clog the rake. When the meal is well mixed with the water, as much boiling water is added as will increase the depth of the mixture to 16 inches, and the temperature will be thereby raised to from 175° to 180°; the rake is then stopped, and the whole permitted to stand for three-quarters of an hour; after which the rake is put in motion again, and the mash stirred until the temperature falls to 148°; then 9 bushels of rye-meal and 2 bushels of rye-malt are added, the whole well stirred, and the rake thrown out of gear for half an hour; at the expiration of which period, the rake is again thrown into gear, and the stirring continued until the mash comes to 116°. The mash is then removed to a fermenting cistern, and the temperature reduced to 80°, by the addition of cold water; the mash being at the same time well stirred.

During the mashing process, a daily yeast is to be prepared, by mashing 24 lbs. of rye-malt and 200 lbs. of rye-meal in 40 gallons of water at 175°, and, after the introduction of 16 gallons of boiling water, allowing the mixture to stand for half an hour; the mixture is then stirred until it falls to 110°, cold water is added to reduce it to 98°, and it is set with what is called stock yeast, which will lower the temperature to 94°, and the whole is well stirred. This yeast, in a high state of fermentation, is run into the fermenting cistern, immediately after the mash has been introduced therein.

The stock yeast is to be prepared the day previous, so as to have settled down by the time it is wanted for daily yeast; it is prepared by mashing 45 lbs. of rye-flour and 10 lbs. of rye-malt in 12 gallons of hop water at 160°, beating the mixture well, covering it over, and allowing it to stand for half an hour; when this time has expired, 4 gallons of hop water at 175° are added, and thoroughly stirred in; then 12 gallons of boiling water are introduced, and the mixture is covered up, and allowed to stand for an hour; after this the mixture is stirred occasionally until the temperature descends to 116°, it is thinned with cold water, and from 5 to 6 gallons of stock yeast, made as described, are added; but, at starting, bakers' or brewers' yeast is used.

The fermenting cistern is 9 feet in diameter at bottom and 6 feet deep, and the depth of the mash will be about 5½ feet; the cistern being open above, the fermentation proceeds very rapidly, commencing about four hours after the yeast has been added, and terminating in forty-two hours, when the mash will be ready to be run into the still, which is furnished with steam pipes or apparatus for applying the heat of steam, instead of the direct heat of a fire, and the distillation is to be conducted in other respects the same as when distilling spirits in the ordinary manner.

The patentee claims the mode of distilling by employing Indian corn with other grain, as above described.—[*Inrolled in the Inrolment Office, March,* 1846.]

To WILLIAM BRUNTON, jun., *of Poole, near Truro, in the county of Cornwall, engineer, for improvements in apparatus for dressing ores.*—[Sealed 2nd November, 1844.]

THE object of this invention is to submit ores to the action of a stream of water, by distributing them upon an inclined table, moveable either continuously or occasionally upward against the stream; whereby the waste is washed off at the bottom of the incline, whilst the clean or dressed ore, by its greater specific gravity, settling upon the moving table, is carried upward beyond the influence of the washing stream, and ultimately deposited in a separate vessel.

The following is the mode of carrying out this invention:—The inclined moveable table is composed of an endless sheet of painted cloth; along each edge, on the outside thereof, is sewn a strip of thick woollen cloth, enclosing a soft hempen rope, which forms a margin to prevent the ore from being washed over the edge of the table; slight bars of wood extend across the cloth on the inside, and are secured at equal distances apart by copper nails, driven into the margin. To support the cloth, a roller, called the head-roller, is constructed, about one inch longer than the width of the cloth, with six or eight bars fixed on its periphery, parallel to its axis, and at such distances apart that they will act as detents against the transverse bars inside the cloth; the gudgeons of this roller are supported between two strong pieces of timber or headstocks, built into and projecting from a wall. A frame of timber, about one foot six inches longer than the table, is also made, consisting of two sides, connected together by several cross-bars, each about one inch longer than the width of the table, and on the cross-bars are fixed four or more longitudinal bearers, upon which the transverse bars, inside the cloth, slide, when the table is at work; the upper end of the frame is supported by and between the headstocks, and the lower end is supported by a screwed rod on each side, entering a fixed cross-piece, by means of which the inclination of the table may be adjusted. At the lower end of the frame a roller, without bars or detents, termed the foot-roller, is mounted, with its upper surface in the same plane as the upper sides of the longitudinal bearers; and at about one-third of the length of the frame from the foot-roller, another plain roller, called the under-roller, is suspended from the lower edges of the frame. The endless cloth extends from the head-roller along the longitudinal bearers to to the foot-roller, and from thence it passes over the under-roller, between which and the head-roller it hangs in a catanarean curve, with its face downward, and low enough to reach about two inches within a cistern containing water, wherein the ore is deposited as the cloth moves onward. At about one-fourth of the length of the table from the top is fixed an inclined board, with diverging channels, to distribute over the whole width of the table the stuff to be dressed, liquified with water; whilst a stream of clear water is caused to flow over the edge of another board upon the upper end of the table.

When the head-roller is made to rotate in the proper direction for moving the cloth from the foot-roller upward, and the liquified ore and clean water are permitted to flow upon the table in suitable quantities, the action of the stream separates the waste from the ore, which, by reason of its greater specific gravity is able to resist the force of the stream, and, adhering to the cloth, is carried over the head-roller into the cistern, where it becomes disengaged by the water, and is deposited therein.

In order that the invention may be thoroughly understood, the patentee has attached to his specification a drawing (see Plate IX.), in which *a*, is the head-roller; *b*, the foot-roller;

c, the under-roller; *d*, the cistern; *e*, the head, over which the liquified ore is distributed upon the endless cloth or table *f*; and *g*, the head, over which the stream of clean water runs.

The patentee claims the dressing ores upon an inclined plane, continuously or occasionally moving up against the stream, and by the same motion depositing the dressed ores in a separate receptacle.—[*Inrolled in the Inrolment Office, May*, 1845.]

Scientific Adjudication.

THE JUDICIAL COMMITTEE OF THE PRIVY COUNCIL.

March 11*th*, 1846.

WOODCROFT'S EXTENSION.

THE Judicial Committee met to-day, Lord Brougham, Dr. Lushington, the Duke of Buccleuch, and Lord Cottenham being the members present, to hear and decide upon an application made by Mr. Woodcroft, the inventor of a particular form of screw propeller, for an extension of his patent.

Mr. Jervis appeared to support the application; and the Solicitor-General, besides watching the proceedings on behalf of the Crown, appeared in opposition on behalf of Mr. Smith and the Ship Propelling Company who have adopted his patent.

Mr. Jervis, in stating the case for his client, said, that the invention for which an application for an extended patent right was now made, differed entirely from every other kind of propelling screw in existence. It was formed on the principle of a spiral, represented by the winding of a circular line ronnd a cylinder. The history of patents for screw propellers (of which he enumerated the advantages) was as follows:—In 1794, Mr. Littleton had taken out the first patent for an invention of that kind, which he proposed working by hand with the capstan, and which was to be either partially or totally immersed in the water, according to circumstances. The next patent for a screw was Mr. Shorter's, taken out in 1800; it consisted of the two vanes of a smoke-jack, not submerged, and adapting itself to the movement of the vessel by a universal joint. In 1815, Mr. Trevithick proposed the Archimedian or fixed screw, working in a cylinder. In 1816, Mr. Millington got a patent for the application of a smoke-jack placed beyond the rudder, and worked with the universal joint. In 1824, Mr. Perkins patented an invention for having two vanes, working in opposite directions, placed at the side of the rudder. In 1828, Mr. Cummerow patented a perfect one-turn screw, fixed parallel to the keel, and held by a stage erected for that purpose beyond the rudder. The date of Mr. Woodcroft's patent was March 22, 1832; and the difference between his spiral and the screw of his predecessors was, that whereas the former consisted of a straight line coiled round a cylinder, the latter was made by a circular line so coiled round. The effect of this invention had been to economize the power of the engine, to destroy the vibration, and to produce a greater speed with fewer revolutions. If a spiral worm was coiled round a cylinder, the angle given thereby would decrease, and the "pitch" therefore increased throughout the length of the shaft. Mr. Woodcroft, in his specification, proposed applying this "spiral" in different parts of the ship, and amongst other places before the rudder-post, by cutting away a part of the hull. Mr. Smith's patent, which was on the application of a perfect screw of one turn placed in the centre of the dead wood, was taken out in 1836. In 1837, Mr. Ericsson patented an invention which differed from that of Mr. Perkins only in being submerged and placed behind the rudder. In 1838, it being ascertained that a perfect screw of one or two turns could not be advantageously worked, owing to the obstruction of the back water, Mr. Lowe took out a patent for cutting the screw into blades, which worked between the rudder and the stern-post. In April, 1839, Mr. Smith entered a memorandum of alteration, in which he stated that he found a screw of two turns would not do, that the true principle was to take two half turns of a screw planted in the centre of the "dead wood." After explaining the evidence that he had to produce as to the usefulness of Mr. Woodcroft's invention, Mr. Jervis concluded:—Having expended 1,200*l.* and upwards in pushing his invention, and having only received in return about 460*l.*, Mr. Woodcroft was entitled to such a renewal of his patent as would enable him to remunerate himself, not only for capital laid out, but for the time and talent which he had spent upon it. Mr. Woodcroft had produced several other inventions, and, in applying for a renewal of his patent, he proposed introducing an improvement on the original plan, by which to alter at pleasure the pitch of the screw.

The formal proofs of Mr. Woodcroft's patent were then put in.

Mr. Carpmael stated that he had studied the subject of the screw propeller for several years. In the use of ordinary screws, the water was put in motion by the first part of the screw, and being of the speed of the second part of the screw, choked the screw. The advantage of this screw was, that the second part was so constructed as to outstrip the motion of the water, so that the instrument was an operative one, whatever might be its length. All other screws consisted of a straight line wound round a cylinder, but that of Mr. Woodcroft was a circle, or segment of it, wound round a cylinder. Tredgold, in his work on propulsion, proposed that the screw should go on with a decreasing angle on an increasing pitch, but he stated nothing about a circle wound round a cylinder, which was Mr. Woodcroft's principle.

Cross-examined by the Solicitor-General.—Mr. Cummerow's patent was a spiral by language, but a screw by description. The words "spiral" or "screw" did not truly designate the distinction. The word "helix" was used at present. He had seen the screw of Mr. Woodcroft in a vessel at Bristol, which had come in from sea about three years ago. With that exception he had never seen it in use. He had never known a screw used practically till the time of the Archimedes, in 1839 and 1840. From that time the use of the screw had increased greatly, both in the Royal and mercantile navy. The screw he saw at Bristol was only one fourth of a convolution, and a three-threaded screw. In practice it was called the one-eighth of a convolution. He had never seen the ordinary screw in operation of more than one convolution; but, as far as his experience went, it would not work. He was satisfied that Mr. Woodcroft's spiral would work with more than one convolution. The varying angle would, he thought, operate all through. The spiral was between the stern-post and the rudder post, raised for the purpose. Smith's patent was placed in the dead wood. Woodcroft's was not technically a spiral, because it did not run up to a point.

By Lord Brougham.—He was acquainted with the former screw-propellers, and considered that the present was different in principle and operation, valuable as well as novel, and following up by successive effects the results of the first screws invented.

Mr. J. Grantham, a civil engineer, formerly a builder in Liverpool, stated that in 1842 he had built a vessel with Woodcroft's propeller, and an expanding pitch of one-tenth. She answered very well, and he had seen her for six months at intervals. The firm had failed, and she had been sold. Mr. Woodcroft's principle was new, and he considered it very valuable. He had taken out seven licenses, and five of the ships were then building. The blades went for one-eighth inch of a convolution, and there were three blades.

Lord Brougham.—Unless you can negative the evidence of Mr. Carpmael, this evidence as to convolution puts us on a wrong issue.

Cross-examined by the Solicitor-General.—He considered that the increasing pitch did give a great advantage, and he had no doubt of the great value of the invention.

Mr. S. Slaughter said he was a partner in the firm of Stoddart, Slaughter, and Co., of Bristol, ship-builders and engineers, and had built two vessel of 120 tons, and one of 130, fitted up with Mr. Woodcroft's "spiral." The former were the fastest boats in Bristol, after two years' experience, and he considered the fastest in the world. He had tried other screws in the vessel before Mr. Woodcroft's, and he greatly preferred the latter. This he considered to be the opinion of ship-builders and engineers.

Cross-examined by the Solicitor-General.—The other screws he had tried were not under any patent, and had varied from one-fourth to one-tenth of a convolution. He tried nine screws of varying diameter and the same pitch. Being dissatisfied, he tried an increasing pitch, and found the advantage of it. He had thus accidentally stumbled on Mr. Woodcroft's invention, and, finding that, he applied for a license. With Mr. Woodcroft's he had attained a speed of fourteen miles an hour, while with others he had only secured a speed of seven and eight miles an hour. In the one case the water "slipped" off the blades, and in the other it did not.

Mr. Guppy, the builder of the Great Britain, stated, that he had become acquainted with Mr. Woodcroft's invention three years ago. The Great Britain was 800-horse power, and its screw at first had not an increasing pitch. The Rattler and Archimedes were tried by him with Woodcroft's screw, and it had increased their speed.

Cross-examined by the Solicitor-General.—He had never seen in the Rattler the result of the experiment between Mr. Smith's and Mr. Woodcroft's screws, but he had in the Archimedes.

Captain Smith, the commander of Her Majesty's ship the Rattler, said, that she had been commissioned in 1844. Several screws had been tried on her, and lastly, that of Mr. Woodcroft. The results had been very good indeed. The following was a memorandum made at the time of the results which it had exhibited:—"I think Mr. Woodcroft's spiral propeller superior to any yet tried in the Rattler. It has less vibration, less fuel is consumed, with fewer revolutions and greater speed; consequently there is less 'slip.' On the 25th of February the result of going with a head wind blowing hard was better than heretofore."

Cross-examined by the Solicitor-General.—He had never made any comparison fairly between Mr. Woodcroft's and Mr. Smith's screw, for the state of the ship was against Mr. Woodcroft's invention; the pitch was from 10 feet 6 inches to 11 feet 2⅜.

Mr. Langdale, the engineer of the Rattler, stated that Mr. Woodcroft's screw gave greater speed, fewer revolutions, less vibration, and used up the power of the engine better.

Mr. Murray, assistant engineer to the Admiralty, said that he could speak to two trials, one on the 13th of April last, and the other on the 18th of March, in which the relative merits of Mr. Smith's and Mr. Woodcroft's invention had been tested. With that of the former the results were as follows:—With the engine giving 26.28, strokes, the rate of speed was 8.18 knots, the slip being 3.143, or 27·758 per cent., and the revolution per minute 104.34. With that of the latter the results were—with the engine giving 24.152 strokes, a revolution per minute of 95.99, a speed of 8·159 knots and a slip of 2.155, or 23.562 per cent. The result exhibited in Mr. Woodcroft's favour a speed nearly as great, with less power of the engine, and much less slip. If the facts which he had stated were reduced, a difference would be shewn of one-sixth of a knot per hour in favour of Mr. Woodcroft. He was aware that by other experiments Mr. Smith's screw had attained a greater velocity.

Mr. Cooper, an engineer, said that the invention was a new and very ingenious one. He illustrated its effect by an experiment on the air with tin blades, modelled after Mr. Woodcroft's screw, and which, when spun rapidly round on an axis by a piece of twine, as a top is spun by a boy, flew up with great force to the ceiling. When the side was reversed, and the experiment repeated, the model was not moved from the axis it revolved on.

Mr. Jervis here gave in a statement of the expenses to which his client had been put in pushing his invention. These amounted to 1,200*l.* in money, while in return he had only received 35*l.*, and there was a sum of about 430*l.* which he had still to get.

Mr. Gardner, a Manchester manufacturer, stated that he had paid 350*l.* for Mr. Woodcroft's travelling expenses, and he was more than 2,000*l.* out of pocket in pushing the invention.

Cross-examined by the Solicitor-General.—Since 1832 he had a joint interest in the invention. He had made very extensive efforts to push it; and Mr. Woodcroft had, he believed, lost twice as much as he, for his loss was in time, while he (the witness) had only lost money.

The Solicitor-General then addressed the Court on behalf of Mr. Smith and the Ship Propelling Company. The question, he said, was whether, on the principles which had been laid down in one or two Acts of Parliament, a sufficient claim could be made out to the extension of the present patent. For this purpose, it was not sufficient for the petitioner to come forward and state, "I have had a patent for 14 years; I have been unable to make anything of it; and I now ask a renewal." It had been laid down by Lord Lyndhurst (in Webster, p. 58), that there must be a serious case of loss; that the discovery or improvement must be a considerable one, and beneficial to a great extent to the public.

Lord Brougham.—That was the case in which a lady (Madame Dulcken) came here and played to us for an hour on the piano.

The Solicitor-General submitted that the present was no case of a useful invention at all. There was nothing new in the idea of using a screw for propelling vessels, as it had been in existence as long ago as 1794. It was Mr. Smith's discovery that the screw should be placed in the centre of the dead wood, which first led to its practical utility. When the screw was so placed, and reduced to between one-fourth and one-eighth of a convolution, all other points with regard to its construction became immaterial. Before Mr. Smith's invention, the screw was placed in unsuitable parts of the vessel, and none of them had ever succeeded. The Solicitor-General then proceeded to explain, with reference to the models produced in court, that it was only by adopting Mr.

Smith's discovery, and inserting the screw in the dead wood, that Mr. Woodcroft had succeeded in making a practical application of his patent. He read an extract from the specification of the latter gentleman, the strongest point in which was as follows:— "The spiral propeller may also be placed under the stern of the vessel, as seen in figures 5 and 6, where a part of the hull is removed." The improvement claimed by him had nothing to do with the position, but was one in reference to an increasing angle. At the time when Mr. Woodcroft took out his patent it was no improvement at all, for want of the discovery that it should be placed in the dead wood.

Lord Brougham.—Yes, Mr. Solicitor; but you must take this into consideration, that if the old invention contained in its bosom the mode of application pointed out in the new, the inventor must have the benefit of that.

Mr. Grantham recalled, and examined by Lord Brougham, stated that the spiral screw was not in the dead wood, but between the stern-post and the rudder-post, in the vessel he was building.

The Solicitor-General continued.—If they were now, as in 1832, asked to extend the patent, and the principle that they were to judge of it now as then prevailed, his argument must be recognised.

Lord Brougham.—But it is now beyond a doubt that some steamers may have no "dead wood" at all.

The Solicitor-General.—Practically it might be so in the case of a Dutch-built vessel, but not one for steam communication. In all vessels there was but one stern-post, and it was playing with language to introduce the terms which had been used in the evidence. He should refer to Mr. Woodcroft's specification hereafter, but in the mean time he would ask if the space filled by Mr. Woodcroft's screw were not so occupied, would it not be the "dead wood." If so, then Mr. Woodcroft's screw was inserted in the dead wood. In his drawing there was no continuation of the keel, but an undue prolongation of the deck, and a stern-post to which the rudder was attached.

Lord Brougham.—I am no ship-builder, and I know nothing about dead wood, and am not likely to do so till I am in my coffin; at least I hope not, for I detest nothing so much, next to being in my coffin, as being in a ship. The petitioner has used the word "removed" in his specification, but that is a technical term, for surgeons talk of removing a leg.

The Solicitor-General.—There was nothing in Woodcroft's patent which could lead to the important result in Mr. Smith's discovery, viz., that of introducing a screw in the centre of the dead wood.

Lord Brougham.—You are going on a wrong issue now. The question raised by them is about a curvilineal spiral, and not as to its position.

The Solicitor-General contended that he was entitled to raise that question to test the value and usefulness of Mr. Woodcroft's invention. Supposing the spiral new, and better than the ordinary screw on which vessels had previously been worked, it was a ground for obtaining a patent now, but that was very different from the present case. The claimant here must satisfy them that he was the author of a useful improvement by proof now, and irrespective of the improvements of another man; but it was only by importing into the specification the improvement of Mr. Smith, that any beneficial result could be got at. Mr. Carpmael's evidence was merely matter of opinion, and not such as their Lordships could rely upon. In the drawings 5 and 6, the modes of using the screws were quite different from that now practised, viz., the introduction of a single screw in the centre line of the dead wood. No particular ratio of angular increase or decrease was claimed by Mr. Woodcroft, and Mr. Cummerow had already discovered the principle. In the patent of the latter the term "spiral" was used, and in the drawing the increasing angle was clearly marked. The convolutions in the drawing were as three to two.

Lord Brougham.—Show me any place in Mr. Cummerow's specification wherein the principle of a circle wound round a cylinder is laid down.

Mr. Cooper was here recalled, and stated that there was no intimation of an increased pitch in the drawing, even taking into account the word spiral in the specification.

Mr. Slaughter also made a confirmatory explanation.

The Solicitor-General then gave up that point, and proceeded to argue that as Mr. Woodcroft had in his specification only provided for one convolution or more, and as there was only evidence of its answering for one-eighth of a convolution, there was no direction in the specification which would guide a workman to the only form of the invention which had practically been found to answer.

Lord Brougham.—The drawing, No. 12, shews only one-eighth of a convolution, being exactly what is now used. His claim is quite general.

The Solicitor-General.—Mr. Carpmael had stated that the spiral would work with any number of convolutions, but, notwithstanding the amount of experience on the subject now, not more than one-quarter of a convolution had in any screw been found to answer. After 14 years' opportunity for experiment, it had been so, and the *onus probandi* therefore lay on Mr. Woodcroft, for shewing that the spiral would work at more than one convolution. As to the account which had been put in to make out a case of hardship, if there be anything in Lord Lyndhurst's *dictum* that such must be a strong case, what did it come to here? The gentlemen who had been called on that subject, had stated facts which had entirely removed the hardship. Did not this lead to the inference that the patent had failed in coming into effect, not from the poverty of the patentee, but from its impracticability without the introduction of another improvement. Deducting the amount of 460*l.* received, or to be received, for licenses, from the total amount of loss, there remained only a sum of 700*l.*, which was not more than the value of a patent. It was impossible to suppose an unsuccessful patent which was not associated with loss, and he saw nothing in the present case which rendered it one of great hardship. He did not think he should call any witnesses with reference to the respective merits of the screw and spiral; and he submitted that the application should be dismissed.

Their Lordships then retired, and, after a short conference, Lord Brougham delivered the judgment:—This application was anything but a matter of course, for a strong case of merit must be made out, and an equally clear case of want of benefit sustained. In all cases where there was a disputed right as to the patent, and where the validity of the patent might come into question, there were two things to be considered. The first was whether the case to prove invalidity of the patent was so clear as to remove all ordinary doubt; the second was whether the case was so doubtful that that Court would rather retire from its consideration and not decide it. In the former case they would not grant the extension, because they did not see the merits, and because they would not put the opposing parties to the vexatious process of bringing their *scire facias* in the law courts. But where the matter was doubtful—where conflicting evidence and questions of law equally arose, that Court would not refuse the discretionary power vested in them by Parliament merely because it was also a case in which the validity of the patent was contested. The present case came under the first principle he had stated. There was nothing to make it clear that the patent should not be sustained until they took away the merit of the invention. If the patent turned out to be invalid, it would only be the extension of such a patent for so many years. Now, as to the merits in this case there could be no doubt. His Lordship gave it as his own opinion on a scientific point, that Mr. Woodcroft's invention was a most ingenious application of mathematical principles to mechanical ends, and he commented on the evidence which had been adduced on the subject. It was not enough to object that the patent had been long in coming into operation, for the steam-engine, and many other discoveries, were open to the same observation. God forbid that he should say it was not a great benefit to society, as in Mr. Gardner's case, that men of capital should assist those who had made useful discoveries with their money. All his time, his ingenuity, and his labour, had probably been exhausted by Mr. Woodcroft on this work. They had every reason to believe that he would be for the next few years in happier circumstances, and more likely to receive compensation. On the grounds he had stated, their Lordships were of opinion that a period of six years should be given by way of extension to the petitioner. What he had said was without reference to Mr. Smith's invention, which might be a most ingenious one.

Scientific Notices.

OBSERVATIONS ON THE MORE RECENT RESEARCHES CONCERNING THE OPERATIONS OF THE BLAST FURNACE IN THE MANUFACTURE OF IRON.—BY DR. J. L. SMITH.

[*From Silliman's Journal for March,* 1846.]

THE great difference existing between metallurgical operations of the present day, and those of a former period, is owing chiefly to the ameliorations produced by the application of the science of chemistry to the *modus operandi* of the various changes taking place during the operations, from their commencement to their termination.

Copper and some other metals are now made to assume forms in the chemist's laboratory, that formerly required great artistical skill for their production—the chemist simply making use of such agents and forces as are at his command, and over which he has, by close analytical study, acquired perfect control. Our object, at present, is only to advert to the chemical investigations more recently made on the manufacture of iron, treating of those changes that occur in the ore, coal, and flux, that are thrown in at the mouth of the furnace, and in the air thrown in from below. For most that will be said on this subject, we are principally indebted to the recent interesting researches of M. Ebelman.

The importance of a knowledge of the facts to be brought forward in this article, will be apparent to every one in any way acquainted with the manufacture of iron. It will be seen, that the time is not far distant when the economy in the article of fuel will amount in value to the present profit of many of the works. The consequence must be, that many of those works that are abandoned will be resumed, and others erected in localities formerly thought unfit.

It is well known that the blast furnace is the first into which the ore is introduced, for the purpose of converting it into malleable iron, and much therefore depends upon the state in which the pig metal passes from this furnace, whether subsequent operations will furnish an iron of the first quality or not.

In putting the blast furnace into operation, the first step is to heat it for some time with coal only. After the furnace has arrived at a proper temperature, ore, fuel, and flux, are thrown in alternately, in small quantities, so as to have the three ingredients properly mixed in their descent.. In from twenty-five to forty-eight hours from the time when the ore is first thrown in, the entire capacity of the furnace, from the tuyer to the mouth, is occupied with the ore, fuel, and flux, in their various stages of transformation.

In order to explain clearly, and in as short a space as possible, what these transformations are, and how they are brought about, we may consider:—1. The changes that take place in the descending mass, composed of ore, fuel, and flux. 2. The changes that take place in the ascending mass, composed of air and its hygrometric moisture, thrown in at the tuyer. 3. The chemical action going on between the ascending and descending masses. 4. The composition of the gases in various parts of the furnace during its operation. 5. The causes that render necessary the great heat of the blast furnace.

1. *Changes that take place in the descending mass, composed of ore, coal, and flux.*—By coal is here meant charcoal; when any other species of fuel is alluded to, it will be specified. In the upper half of the fire-room, the materials are subjected to a comparatively low temperature, and they lose only the moisture, volatile matter, hydrogen, and carbonic acid, that they may contain; this change taking place principally in the lower part of the upper half of the fire-room.

In the lower half of the fire-room, the ore is the only material that undergoes a change, it being converted wholly or in part into iron or magnetic oxide of iron—the coal is not altered, no consumption of it taking place from the mouth down to the commencement of the boshes.

From the commencement of the boshes down to the tuyer, the reduction of the ore is completed. Very little of the coal is consumed between the boshes and in the upper part of the hearth; the principal consumption of it taking place in the immediate neighbourhood of the tuyer.

The fusion of the iron and slag occurs at a short distance above the tuyer, and it is in the hearth of the furnace that the iron combines with a portion of the coal to form the fusible carburet or pig-iron. It is also on the hearth that the flux combines with the siliceous and other impurities of the ore. This concludes the changes which the ore, coal, and flux undergo from the mouth of the furnace to the tuyer.

If the fuel used be wood, or partly wood, it is during its passage through the upper half of the fire-room that its volatile parts are lost, and it becomes converted into charcoal. M. Ebelman ascertained that wood, at the depth of ten feet, in a fire-room twenty-six feet high, preserved its appearance after an exposure for 1¾ of an hour, and that the mineral mixed with it preserved its moisture at this depth; but three and a half feet lower, an exposure of 3¼ hours reduced the wood to perfect charcoal, and the ore to magnetic oxide. The temperature of the upper half of the fire-room, when wood is used, is lower than in the case of charcoal, from the great amount of heat made latent by the vapour arising from the wood. In the case of bituminous coal, Bunsen and Playfair find that it has to descend still lower before it is perfectly coked.

After the wood is completely charred, or the coal become coked, the subsequent changes are the same that happen in the charcoal furnaces.

2. *Changes that take place in the ascending mass, which is composed of air and hygrometric moisture.*—The weight of the air thrown in at the tuyer in twenty-four hours is twice that of the ore, coal, and flux, thrown in at the mouth during the same time.

The air, as soon as it enters the tuyer and reaches the first portion of coal, undergoes a change—its oxygen is converted into carbonic acid, and its moisture decomposed, furnishing hydrogen and carbonic oxide—after ascending a short distance, (12 or 18 inches,) the carbonic acid is converted into carbonic oxide—between this point and the upper part of the boshes it undergoes but very little change, having added to it a further small amount of carbonic oxide. So the ascending column at the top of the boshes is composed of nitrogen, carbonic oxide and hydrogen—from this point it begins to undergo a change; the carbonic oxide diminishes, carbonic acid appears, and goes on increasing for about half the way up the fire-room; after which the carbonic acid, carbonic oxide, and nitrogen remain the same, when the hydrogen increases, and moisture begins to appear and augment up to the mouth. The ascending mass, as it passes out of the mouth, contains the vapour of water, carbonic acid, carbonic oxide, hydrogen, and nitrogen. The nitrogen undergoes no alteration in its passage through the furnace, and the same is true of the hydrogen formed at the tuyer.

If wood be used, the gases passing out of the mouth are the same as those just mentioned, with an increased quantity of moisture, and the addition of those pyroligneous products arising from the dry distillation of wood.

In case of the use of bituminous coal, the gases, first alluded to, have added to them ammonia, light carburetted hydrogen, olefiant gas, carburetted hydrogen of unknown composition, and sulphuretted hydrogen.

3. *The chemical reaction occurring between the ascending and descending masses.*—From the foregoing statements we can at a glance see what are the materials to be met with in the different parts of the furnace, and can therefore readily study their reactions upon each other.

In the upper half of the fire-room little or no chemical action is taking place, the ore, flux, and coal, as already stated, simply losing their volatile parts. In the bottom of the upper half and the entire lower half of the fire-room a reaction is taking place between the ore and the carbonic oxide of the ascending column; iron or magnetic oxide of iron and carbonic acid being the result. It must be borne in mind that the coal has played no part in this reduction down to the commencement of the boshes. Between the boshes, and in the hearth, no reaction appears to take place between the ascending and descending masses, but the reduction of the ore is completed by the direct action of the coal upon the remaining portion of the undecomposed ore; carbonic oxide being formed;—and here is the first consumption of the coal in its passage downwards.

According to M. Ebelman, the ore loses in the fire-room $\frac{28}{33}$ of its oxygen by the reaction of the oxide of carbon, and the remaining $\frac{5}{33}$ disappears in the boshes and hearth, in the manner already stated, at the expense of from $\frac{6}{100}$ to $\frac{12}{100}$ of the entire amount of charcoal used.

The ore being now completely reduced, unites with a portion of carbon in the hearth, melts at about 13 inches from the tuyer, and descends into the crucible; and here also the flux, combining with the impurities of the ore, forms the slag, which melts.

The coal and the air react upon each other most powerfully just in the neighbourhood of the tuyer, where the most intense heat is produced; the oxygen becomes converted into carbonic acid, which acting upon a portion of the ignited coal, is almost at the same moment reduced to carbonic oxide; the moisture of air acting on the ignited charcoal undergoes the decomposition already mentioned, hydrogen and carbonic oxide resulting therefrom.

When the ore is easy of reduction, the gas at the boshes is represented by 100 nitrogen and 52·5 carbonic oxide, *plus* the quantity of carbonic oxide and hydrogen afforded by the moisture.

It must be clearly understood, that these rules do not apply to every variety of ore. They are especially applicable to the hematites and such ores as are either naturally porous or become so in their passage through the fire-room of the furnace, thus increasing the surface of contact exposed to the action of the reducing agent (carbonic oxide), so that when it has reached the boshes the reduction is nearly complete.

The specular, magnetic, and siliceous ores, are reduced with much more difficulty; most of the ore, in these cases, reaching the boshes but slightly altered, they being principally dependent upon the direct action of coal for their reduction. This circumstance largely increases the consumption of coal when any of these ores are employed; and the amount of caloric made latent, in consequence of the reduction requiring the direct action of the coal, is very great; whereas in the reduction of the ore by carbonic oxide no heat becomes latent, for the heat rendered latent by the oxygen of the ore becoming gaseous, is compensated by the sensible heat produced by the combination of the carbonic oxide with the oxygen. Where the reduction is produced by the carbon, with the formation of carbonic oxide, 1598 unities of heat are made sensible, while 6216 are rendered latent, giving a difference of absolute loss of 4618.

It should be the object of the metallurgist to reduce as much of the iron as possible by the oxide of carbon. Magnetic, siliceous, and other hard ores, should be reduced to smaller fragments than those softer and more easily managed. Were it possible to reduce them to powder without the danger of choking the furnace, it would be all the better, as the great object is to have a large extent of surface exposed to the carbonic oxide. The different capacity of different ores for reduction shews the necessity of having furnaces of different dimensions for them respectively.

The matter which covers the melted metal in the crucible, and that which adheres to the interior of the hearth, contains silicate of iron and charcoal in a pasty state, and there is consequently a constant reduction of the oxide of iron, which gives rise to carbonic oxide; this gas bubbles through the slag, which, if drawn off at this time, will, when cold, present a porous structure,—a sure indication that the furnace is not working well, and that the slag itself contains much of the ore in the form of a silicate.

4. *Composition of the gas in various parts of the furnace during its operation.*—The analyses lately made by Ebelman are the most accurate and best detailed that we are in possession of. What follows has reference to a furnace worked with charcoal.

Gas taken from the mouth of the furnace and dried:—

Carbonic acid	12·88
Carbonic oxide	23·51
Hydrogen	5·82
Nitrogen	57·79

The vapour of water in a hundred volumes of this gas, varies from nine to fourteen volumes. Examinations made at different times shew the proportion of hydrogen and nitrogen to be nearly uniform, and that the sum of the volumes of carbonic acid and carbonic oxide is constant, but that there is a variation in their respective proportions.

Gas taken from the interior of the fire-room at 5 *to* 10, *and* 13 *to* 17 *feet from the mouth (fire-room* 36 *feet).* From five to ten feet the proportion of moisture diminishes, the other ingredients remaining about the same. From thirteen to seventeen feet the proportion of carbonic oxide increases, while the carbonic acid and hydrogen diminish.

Gas from the bottom of the fire-room and top of the boshes:— This is remarkable for the constancy of its composition, and for the absence of carbonic acid and watery vapour. Composition:—

Carbonic oxide	35·01
Hydrogen	1·92
Nitrogen	63·07

Gas from the bottom of the boshes and commencement of the hearth:—

Carbonic acid	0·31
Carbonic oxide	41·59
Hydrogen	1·42
Nitrogen	56·68

Gas from the neighbourhood of the tuyer:—

Carbonic oxide	51·35
Hydrogen	1·25
Nitrogen	47·40

The two last statements would appear to contradict the rules previously laid down, as regulating the operation of the blast furnace; for, according to them, the proportion of carbonic oxide, at the top of the boshes, should be a little greater than in the hearth, whereas the reverse would appear to be the case by the analyses here given. Besides, from a glance at the composition of the three last gases alluded to, it would appear that the gaseous products, as they ascended the furnace, lost completely a portion of the carbonic oxide, without a replacement by carbonic acid or other compound; in other words, a portion of it would appear to be completely annihilated, which of course is an impossibility. This apparent anomaly is easily accounted for, when it is stated how the gas was collected.

In order to obtain the gas from different portions of the furnace, holes were bored into the side, and a tube inserted, by which it was drawn off. Allusion has already been made to the fact that a pasty mass adheres to the sides of the hearth, containing silicate of iron and charcoal, in which there is a constant reduction of the iron, with the formation of carbonic oxide. Now it is evident that the gas drawn off by a hole bored into the side of the hearth will be largely mixed with this carbonic oxide forming in the immediate neighbourhood of the opening, and that it cannot serve as an index to the character of gas passing through the centre of the hearth. M. Ebelman was aware of this fact, but he was not able to overcome the difficulties in the way of obtaining the gas under the proper circumstances.

Gas taken at the tuyer.—Here it is little else than atmosphere mixed with a few per cent. of carbonic acid.

From these results it will not be difficult to admit, that the oxygen of the air is converted immediately into carbonic acid, which is rapidly changed into carbonic oxide, under the influence of an excess of carbon and the high temperature developed near the tuyer.

5. *The causes that render necessary the great heat of the blast furnace.*—The weight of the ore, flux, and combustible, which enters the furnace, being only one half that of the ascending column, and as the specific heat of these three materials is very much below that of the gas of the ascending mass, it is not the heating of them that explains the necessity of the very great heat of the blast furnace. But the principal cooling causes are,—

1. The drying of the ore, flux, and coal, and the expulsion of carbonic acid from the flux, &c., rendering much of the heat latent; for what was solid is now transformed to the gaseous state.

2. The reduction of the ore, or in other words, the transfor-

mation of the solid oxygen of the ore into gaseous oxygen. If the ore has been deprived of its oxygen by the action of carbonic oxide, with the formation of carbonic acid, the heat rendered latent by the oxygen, is compensated for by the heat developed by the reaction between the oxygen and carbonic oxide; which is the character of the operation that principally takes place in the lower part of the fire-room. If the ore has been deprived of its oxygen by the direct action of the coal, the amount of heat rendered latent is enormous, as already stated; for carbonic oxide is the result of this reaction, and the amount of heat developed by it falls far short of that rendered latent by the oxygen that has entered into its formation, assuming the gaseous condition,—this is the character of the reduction taking place in the boshes and hearth.

3. The conversion of the carbonic acid near the tuyer into carbonic oxide has a powerful influence in cooling the upper part of the hearth; for of the 6260 units of heat formed by the first action of the air upon the coal, 4662 are rendered latent by the conversion of this carbonic acid into carbonic oxide.

This terminates what it was proposed to treat of; it is little else than a sketch of the chemistry of the blast furnace, sufficient to shew its importance.

In a future article, some remarks will be made upon the amount of combustible lost in the operation of this furnace, the recent methods employed to prevent this loss in the complete combustion of coal, the action of the hot blast, theory of the refining furnace, charring of wood, and other points of interest.

FREEZING OF WATER BY THE AIR-PUMP, WITHOUT THE AID OF SULPHURIC ACID OR ANY OTHER DESICCATING AGENT.—BY J. LAWRENCE SMITH.

In attempting to freeze water under the air-pump, without the aid of a desiccating agent, the cooling of the water to the point of congelation is prevented by the heat received from the containing vessel. I have lately found that by obviating this difficulty, water may be readily frozen by its own evaporation.

It was first shewn by Count Rumford that water does not wet a sooted surface, but forms in globules, like quicksilver. Three drops of water were placed in a sooted watch-glass; the spheroidal globule lay on the soot, exposing a large surface for evaporation, at the same time that the water was insulated from any source of heat. Arranged in this manner, and placed under an air-pump, two or three minutes were sufficient to freeze the water. The glass was sooted over an oil lamp with great care;—the experiment fails if the globule of water touches the glass, even by a small point.

In place of the sooted watch-glass, make a shallow cavity in the end of a large cork, and over a lamp, burn it, sooting it at the same time. By putting three drops of water into the cavity thus prepared, and subjecting it to the action of the air-pump under a pint receiver, the water froze solid in a minute and a half; and in two and three-fourths minutes, 20 grains of water congealed, though at 73° Fahr. when introduced. Under a receiver of three quarts capacity, 20 grains of water froze in four minutes. I could not succeed in freezing the same amount in the sooted watch-glass.

By placing corks, prepared as above, over a saucer of sulphuric acid, the same results are obtained more rapidly. I put half a drachm of water, at 65° Fahr., in each cavity, and exhausted the receiver till the mercurial gauge reached 4-10ths of an inch, which was effected in one minute. In a minute and a half, the water on one cork began to freeze, and in five minutes they were all frozen. An ounce of water, in a large flat cavity, froze in 3½ minutes.

A flat-bottomed porcelain capsule was prepared for an experiment on a large scale, by sooting it in the following manner:—After coating it with soot over a lamp, and allowing it to cool a little, a small quantity of oil of turpentine was carefully poured upon the edge, and passed over the entire surface; the vessel was then warmed to drive off the redundant turpentine. The surface was again coated with soot, and again with turpentine; and this process was repeated a third time; finally, another coating of soot was added, when it was ready for use. Two ounces of water were placed in this capsule under a receiver, and the air-pump worked for one minute. After standing six minutes, the surface was frozen.

This experiment, as well as similar ones, was attended with violent ebullition on the part of the liquid, throwing the water against the sides of the receiver, which was owing to the rapid formation of vapour on the under surface of the liquid.—*Ibid.*

DISCOVERIES WITH THE GREAT REFRACTOR AT CINCINNATI.

In an interesting communication published in the Daily Atlas (Cincinnati) of Feb. 11th, 1846, Prof. Mitchell, the able director of the Cincinnati Observatory, announces that he has devoted all the time he could command to an examination, with the noble instrument pertaining to that establishment, of a zone in the heavens, extending from 15° to 40° of Southern Declination. The number of new double and multiple stars already thus discovered amounts to one hundred and fifty-five. Of those of the former class, the most interesting is *Antares*, a star of the first magnitude in *Scorpio*, which, on the 13th June, 1845, Prof. M. detected to be accompanied by a minute stellar companion, distant only 1·7″, and this discovery he has confirmed by repeated observation. There is every reason to suppose that this splendid and often-observed star had never before been seen double. Of the latter class is a triple star in the *Pleiades*. When first discovered, several months since, the three stars were precisely in the same straight line. By an observation of Feb. 9, 1846, it appeared that " the line drawn through the two minute stars no longer passed through the centre of the larger star, and shews, conclusively, a rapid motion in the minute star next to the principal one." We shall wait, with much interest, for the many important discoveries yet to be revealed by the aid of this powerful instrument.—*Ibid.*

ON THE VOLATILE ACIDS OF CHEESE.—BY MM. ILJENKO AND LASKOWSKI.

[*Journ. de Pharm. et de Ch.*, Decembre, 1845.]

The authors cut fifty pounds of Limbourg cheese, which possessed a very strong odour, into small pieces, mixed them with water, and submitted the mixture to distillation in a large alembic, water being occasionally added during several days. By this operation a somewhat turbid ammoniacal liquor was obtained, which was supersaturated with sulphuric acid and again distilled. The product was afterwards saturated with barytes water; the salt obtained was evaporated to its crystallizing point; the acid was again separated and converted into a salt of silver. Analysis shewed that this volatile acid was entirely valerianic acid.

The residue was afterwards saponified by means of potash, the soap decomposed by potash, and subjected to a fresh distillation, and there was thus obtained an acid liquid which was saturated with barytes and evaporated to crystallize; it yielded a mixture of several salts of barytes, which were separated by means of their different solubility in water. The rough salt was mixed with seven parts of water and heated to boiling; the caproate of barytes dissolved, and afterwards separated in crystalline tufts of considerable size, whilst the butyrate remained in solution; this was converted into a salt of silver and analyzed.

The barytic salts, which were not dissolved by the seven parts of boiling water, were composed of caproate and caprylate of barytes; and they also were separated by their different solubility.

It appears then that cheese contains the following volatile acids:—

Butyric acid	$C^4\ H^8\ O^2$
Valerianic acid	$C^5\ H^{10}\ O^2$
Caproic acid	$C^6\ H^{12}\ O^2$
Caprylic acid	$C^8\ H^{16}\ O^2$
Capric acid	$C^{20}\ H^{20}\ O^2$

Valerianic acid occurs in the largest quantity, and its presence had been previously discovered by M. Balard in the cheese of Roquefort. All these acids, it will be observed, are homologous substances.

The authors also performed some experiments on the fused portion of cheese; they obtained by means of boiling alcohol perfectly crystalline margarine from it; it was fusible at 127° Fahr., and margaric acid was obtained from it. The rough margarine was mixed with some liquid glycerine. Unaltered caseine was also present, soluble in boiling water and insoluble in alcohol. There was also present lime, a little magnesia, soda, potash, traces of iron, phosphoric acid, chlorine, and sulphuric acid.

LIST OF REGISTRATIONS EFFECTED UNDER THE ACT FOR PROTECTING NEW AND ORIGINAL DESIGNS FOR ARTICLES OF UTILITY.

1846.

Feb. 26. *Robert Steddal*, of Nelson-street, Greenwich, ironmonger, for the Eolian chimney guard.

27. *John & Robert Mallet*, of the Victoria Foundry, Dublin, for a railway screw bolt and nut.

28. *John Braddock Walmsley*, of Maple, Cheshire, cotton spinner, for a can or receptacle for rovings or other preparation of cotton.

Feb. 28. *Thresher & Glenny,* of 152, Strand, outfitters, for a travelling case, to be used in the place of portmanteaus and bags.

28. *Thomas & George Barnes,* of Goswell-street, Middlesex, brace makers, for the flexible razor strop.

28. *W. Ford,* of Brixton, Surrey, coach proprietor, for the omnibus ventilator.

Mar. 4. *Nathan Defries,* of 26, Grafton-street, Fitzroy-square, for a design for the configuration of apparatus for admitting gas to and from a dry gas-meter, in such a manner that the gas shall not come in contact with the gearing of the valves and parts for registering the quantity of gas passing through the meter.

5. *Nathan Defries,* of 26, Grafton street, Fitzroy-square, for a design for the configuration of apparatus for admitting gas to and from a dry gas-meter, in such a manner that the gas shall not come in contact with the gearing of the valves and parts for registering the quantity of gas passing through the meter.

5. *Charles Bray,* of 14, Cranbourne-street, Leicester-square, for a pair of scissors for cutting lamp cottons.

7. *William Gunton,* of Harrington-square, Hampstead-road, for a reading easel.

7. *John Sinclair,* of North-crescent, Bedford-square, Middlesex, for the Sinclair indicator or self-instructing name board, for the piano-forte or organ.

9. *William Henry Bentley,* of Bedford, ironmonger, for the aquarian shower pot.

10. *John Chatwin Stokes,* of Birmingham, plumber, for a new shape of basin, and also a trap to the basin of a water-closet.

13. *Parker & Acott,* of 54, Brearley-street, West Birmingham, for an improved elongated pencil.

13. *Isabella Frances Maria Theresa Mills,* of Bishopsteighton, in the county of Devon, for an engraving tool.

14. *William & Joseph Harcourt,* of Bristol-street, Birmingham, brass founders, for an improved bell carriage and regulator.

17. *William Matthews,* of 10, Portugal-street, Lincoln's Inn, for a speculum.

17. *George Blackmur,* of 98, York-street, Commercial-road, for the Albert spring stop for umbrellas.

17. *John Fuller & Co.,* of Nos. 95, and 96, Long-lane, Southwark, for a ventilating hat.

18. *John Latchford,* of 180, Piccadilly, London, and *Thomas Smith,* of Hill House, Hambledon, Hampshire, for a bit.

Mar. 18. *John Heather*, of 3, Bedford-court, Covent Garden, for a splint and belts for fractured clavicle and other injuries of the shoulder.

19. *William & Joseph Harcourt*, of Bristol-street, Birmingham, brass founders, for an improved lever bell-pull.

19. *John William Sprules*, of Blue Anchor-road, Bermondsey, and *James Simpson Prockter*, of Fort-place, Grange-road, Bermondsey, for a binding press.

21. *James Murray*, of Dundee, for an improved whaling lance.

23. *John Bartholomew Rotherham*, of Whiston, for an improved thrashing machine.

24. *Cotton & Davies*, of 22, Cheapside, Dale-street, Liverpool, for a mill-stone.

26. *E. Wakeling & Son*, Admiralty upholsterers, of Gerrard-street, Soho, for a ventilating bed top.

21. *Alfred Dunn*, of 14, Chandos-street, Strand, for a portfolio.

List of Patents

That have passed the Great Seal of IRELAND, from the 15*th August*, 1845, *to the* 20*th March*, 1846, *inclusive.*

To William Hannis Taylor, of Piccadilly, in the county of Middlesex, Gent., and Thomas Bartlet Simpson, of Great Russell-street, in the same county, Gent., for certain improvements in propelling.—Sealed 15th August.

Richard Simpson, of the Strand, London, Gent., for certain improvements in bleaching yarns and fabrics.—Sealed 10th September.

Moses Poole, of London, Gent., for certain improvements in preparing or treating hemp, flax, and other textile plants.—Sealed 22nd September.

Charles Dod, of No. 3, Little Argyle-street, Regent-street, in the county of Middlesex, Gent., for certain improvements in the construction of railways and tram-roads, and in the carriages to be used thereon and otherwise.—Sealed 22nd September.

Elijah Galloway, of No. 210, Strand, in the county of Middlesex, engineer, for improvements in propelling railway carriages.—Sealed 4th October.

Elias Robinson Handcock, of No. 16, Regent-street, in the county of Middlesex, Esq., for certain improvements in mechanism, applicable to turn-tables for changing the position of engines on railways, which improvements are also applicable to cranes and other purposes.—Sealed 7th October.

Thomas Drew, of St. Austell-street, in the county of Cornwall, Chemist, and Edward Stocker, of the same place, merchant, for certain improvements in the production and manufacture of naphtha, pyroligneous acid, or other inflammable matter.—Sealed 14th October.

Thomas Brown Jordan, of Cottage-road, Pimlico, in the county of Middlesex, mathematical divider, for improvements in machinery and apparatus for cutting, carving, and engraving.—Sealed 14th October.

Robert Griffith, of Smethwick, near Birmingham, in the county of Stafford, engineer, for improvements in the manufacture of bolts, railway pins, spikes, and rivets.—Sealed 15th October.

William Young, of Paisley, manufacturer and dyer, and Archibald M'Nair, of the same town, merchant, for certain improvements in the construction and means of manufacturing apparatus for conducting electricity.—Sealed 17th October.

William Yates, of Manchester, in the county of Lancaster, upholsterer, and Denis Dolan, of the same place, scagliola manufacturer, for certain improvements in plastic manufacture or composition; part of which is applicable to decorative and useful purposes, and part as a fire-proof cement or plaster.—Sealed 17th October.

Charles Wheatstone, of Conduit-street, in the county of Middlesex, Esq., and William Fothergill Cooke, of Kidbrooke, near Blackheath, in the county of Kent, Esq., for improvements in electric telegraphs, and in apparatus relating thereto; part of which improvements are applicable to other purposes.—Sealed 22nd October.

Charles Murland, of Castlewellan, in the county of Down, and kingdom of Ireland, flax-spinner, and Edward Lawson, of Leeds, in the county of York, machine-maker, for certain improvements in machinery for preparing and spinning flax and other fibrous substances.—Sealed 22nd October.

Richard Prosser, of Birmingham, in the county of Warwick, for improvements in the manufacture of metal tubes, and in the machinery and apparatus for producing the same, and in the apparatus for fastening tubes in their intended places in steam-boilers and other vessels.—Sealed 28th October.

John Ayre, of the borough and parish of Tynemouth, in the county of Northumberland, sail-maker, for an improved fabric for sail-cloth.—Sealed 28th October.

Isham Baggs, of Great Percy-street, Claremont-square, in the county of Middlesex, engineer, for improvements in obtaining motive power by air.—Sealed 30th October.

Edward Wilkins, of Surrey-place, Old Kent-road, Surrey, tanner and currier, for improvements in the manufacture of leather.—Sealed 6th November.

William Walker, the younger, of Manchester, in the county of Lancaster, hydraulic engineer, for improvements in warming and ventilating apartments in buildings.—Sealed 7th November.

Dominic Frick Albert, of Manchester, in the county of Lancaster, consulting manufacturing chemist, LL.D., for a certain improved application of materials to the manufacture of soap.—Sealed 11th November.

James Hardcastle, of Firwood, Bolton-le-Moors, in the county of Lancaster, Esq., for certain improvements in the method of conveying water.—Sealed 11th November.

John Campbell, of Browfield, in the county of Renfew, Scotland, bleacher, for certain improvements in the apparatus or machine for drying and finishing of bleached cotton and other goods.—Sealed 12th November.

Alexander Wilson, of Glasgow, in the county of Lanark, manager for Alexander Fletcher & Co., flax-spinners, for improvements in spinning hemp and flax, and other fibrous materials.—Sealed 21st November.

Thomas William Gilbert, of Limehouse, in the county of Middlesex, sail-maker, for improvements in the construction of sails for ships and other vessels.—Sealed 22nd November.

Joseph Almesbury, of Devonshire-street, Portland-place, county of Middlesex, surgeon, for improvements or apparatus for the relief or correction of stiffness, weakness, or distortion in the human body.—Sealed 22nd November.

Richard A. Brooman, of No. 166, Fleet-street, in the city of London, Gent., for improved modes of preparing gutta-percha, for manufacturing purposes.—Sealed 22nd November.

Moses Poole, of London, Gent., for improvements in rails for railways.—Sealed 24th November.

Henry Buckworth Powell, of Pennington House, in the county of Southampton, Captain in the Grenadier Guards, for improvements to be used on rail and other roads.—Sealed 26th November.

Joseph Washington Tyson, of Burton-crescent, in the county of Middlesex, Esq., for improvements in fire-arms and ordnance.—Sealed 6th December.

George Myers, of Laurie Terrace, Westminster-road, Lambeth, builder, for improvements in cutting or carving wood, stone, and other materials.—Sealed 6th December.

James Hardcastle, of Firwood, Bolton-le-Moors, Lancashire, Esq., for certain improvements in the method of scouring, bleaching, preparing, dyeing, and finishing piece goods or woven fabrics.—Sealed 6th December.

William M'Naught, of Robertson-street, Glasgow, for certain improvements in the steam-engine.—Sealed 8th December.

Edward Patrick Emerson, of the city of Dublin, doctor of medicine, for improvements in the manufacture of paints, pigments, and other plastic compositions, and in the machinery or apparatus to be used in such manufacture; parts of which improvements are also applicable to the manufacture of artificial stone and marble.—Sealed 10th December.

Alexander Bain, of Hanover-street, Edinburgh, engineer, for improvements in electric clocks and electric telegraphs.—Sealed 10th December.

William Joseph Conrad Marie Baron de Liebhaber, of Paris, in the kingdom of France, for improvements in blasting rocks and other mineral substances, for mining and other purposes; and an apparatus to be used in such works.—Sealed 10th December.

Arthur Parsey, of Spur-street, Leicester-square, in the county of Middlesex, artist and scientific draughtsman, for improvements in obtaining motive power.—Sealed 10th December.

James Johnston, of Greenock, Esq., for new and improved processes and machinery for making and refining sugar.—Sealed 11th December.

William Newton, of the Office of Patents, 66, Chancery Lane, Middlesex, civil engineer, for improvements in machinery to be employed in the manufacturing of types and other similar raised surfaces for printing.—Sealed 12th December.

William Edward Staite, and William Greener, of Birmingham, in the county of Warwick, gun-makers, for improved means of ignition and illumination.—Sealed 13th December.

Thomas Bell, of the Don Alkali Works, South Shields, in the county of Durham, for improvements in certain processes in the manufacture of alkali, which improvements are applicable to the purposes of condensation.—Sealed 16th December.

Joseph Francis Laubereau, of Paris, in the kingdom of France, Gent., for improvements in obtaining power.—Sealed 19th December.

Richard Archibald Brooman, of No. 146, Fleet-street, in the county of Middlesex, for certain improvements in weaving machinery.—Sealed 17th December.

Thomas Clarke, and John Varley, of Poplar, in the county of Middlesex, for improvements in propelling railway and other carriages, and in engines, carriages, and other matters, employed in propelling.—Sealed 23rd December.

John Depledge, of the Thorncliff Iron Works, near Sheffield, draughtsman, for a certain improved metallic broacher.—Sealed 23rd December.

John and George Cox, of Gorgie Mills, county of Edinburgh, tanners and glue makers, for improvements in tanning and leather dressing.—Sealed 24th December.

Stephen Hutchison, of the London Gas Works, Vauxhall, in the county of Surrey, engineer, for certain improvements in gas-meters.—Sealed 30th December.

Thomas Moss, of Gainsford-street, Barnsbury-road, in the county of Middlesex, engineer, for improvements in preparing and printing bankers' notes, checks, and other papers, for the better prevention of fraud.—Sealed 30th December.

James Higgins, of Salford, in the county of Lancaster, machine-maker, and Thomas S. Whitworth, of Salford, aforesaid, mechanist, for certain improvements in machinery for preparing and spinning cotton, wool, flax, and similar fibrous materials.—Sealed 30th December.

William Newton, of the Office for Patents, 66, Chancery Lane, London, for improvements in machinery to be employed in the manufacturing of nails, rivets, screws, and pins.—Sealed 30th December.

Henry Blumberg, of Camberwell-grove, in the county of Surrey, distiller, for improvements in the purification of spirits for the use of brewing-distillers, and rectifiers.—Sealed 28th January, 1846.

Ernest Edge, of Manchester, in the county of Lancaster, mechanic, for improvements applicable to the wheels and axles of engines, tenders, carriages, and waggons, to be used upon railways.—Sealed 28th January.

John Lord, of Friday Bridge, Birmingham, in the county of Warwick, merchant, for improvements in supplying steam-boilers with water.—Sealed 28th January.

Alfred Watney, of Wandsworth, in the county of Surrey, Gent., for improvements in the manufacture of horse-shoes, and in applying shoes to horses and other animals.—Sealed 28th January.

William Sykes Ward, of Leathley Lodge, Hunslet-lane, in the parish of Leeds, in the county of York, Gent., for improvements in exhausting air from tubes or vessels for the purpose of working atmospheric railways, and for other purposes; and improvements in the valves and tubes of same.—Sealed 28th January.

William Eccles, and Henry Brierly, both of the township of Walton-le-Dale, in the parish of Blacham, in the county Palatine of Lancaster, for improvements in machinery or apparatus for spinning.—Sealed 4th February.

Charles Henry Joseph Forrett, of Lile, in France, but now of No. 17, Great St. Helen's, Bishopsgate, for a new improved Archimedian screw, which he calls "Davaine's screw."—Sealed 4th February.

Frederick Bankart, of Champion Park, Denmark Hill, Surrey, Gent., for certain improvements in heating certain metallic ores, and refining the products therefrom.—Sealed 14th February.

Paul Ackerman, of No. 1, Size-place, in the city of London, for certain improvements in harpoons and other similar instruments.—Sealed 25th February.

John Walker, of Manchester, in the county of Lancaster, silk manufacturer, for improvements in weaving or manufacturing piled or napped cloths or fabrics, and also for improvements in machinery for cutting the pile or nap of the same.—Sealed 3rd March.

William Henson, of Tabor Cottage, Wharf-road, City-road, in the county of Middlesex, civil engineer, for improvements in machinery for weaving.—Sealed 4th March.

John Harcourt Brown, of Brunswick-place, Barnsbury-road, county of Middlesex, Gent., for improvements in securing letters, envelopes, covers, despatches, packets, and parcels.—Sealed 4th March.

John Paltrineri, of 1, Skinners-place, Size-lane, London, Gent., for certain new and improved modes of obtaining and applying motive power.—Sealed 7th March.

John Field, jun., of West Buxton, in the county of Surrey, Gent., for improvements in apparatus for ascertaining the alcoholic strength of liquids.—being a communication.—Sealed 7th March.

John Berkeley Cotter, of the city of Dublin, Gent., for improvements in the preparation and manufacture of woven fabrics, applicable to various useful purposes.—Sealed 9th March.

Conrad Haverkam Greenhow, of North Wales, Gent., for improvements in the construction of railways and railway carriages.—Sealed 9th March.

Thomas Henry Russell, of Wednesbury, in the county of Stafford, tube manufacturer, for improvements in the manufacture of welded iron tubes.—Sealed 9th March.

John Dearman Dunnicliff, of Nottingham, lace manufacturer; and William Bull Dexter, of the same place, lace maker, for improvements in the manufacture of warp fabrics.—Sealed 10th March.

Joseph Douglas, of Cross Cheaping, Coventry, furnishing ironmonger, for improvements in the patterns used for casting, and in casting metals.—Sealed 10th March.

Nathaniel Chappell, of Arcadian Villa, Cumberland-road, in the city of Bristol, Gent., for improvements in the manufacture of worts.—Sealed 10th March.

John Constable, of the city of London, for certain improvements in the manufacture of gas for lighting and heating,—being a communication.—Sealed 10th March.

Juan Nepomuceno Adorno, of Mexico, in the Republic of Mexico, Gent., for improvements in the manufacture of cigars, and other similar articles.—Sealed 11th March.

Robert Griffiths, of Havre, in the kingdom of France; George Hinton Bovill, of Millwall, in the county of Middlesex; and George Hennett, of Bristol, engineers, for improvements in the construction of parts of apparatus used for propelling carriges and vessels by the atmosphere; and improvements in propelling carriages and vessels by atmospheric pressure.—Sealed 19th March.

Alfred Vincent Newton, of the Office for Patents, 66, Chancery-lane, in the county of Middlesex, mechanical draughtsman, for improvements in combing wool,—being a communication. —Sealed 20th March.

Joseph Zambeaux, of Paris, in the kingdom of France, chemist, for improvements in atmospheric railways. — Sealed 20th March.

William Henry Fox Talbot, of Lacock Abbey, Chippenham, in the county of Wilts, Esq., for improvements in obtaining motive power, and in the application of motive power to railways.—Sealed 20th March.

List of Patents

Granted for SCOTLAND, subsequent to February 22nd, 1846.

To William James Cantells, of Paris-street, North Lambeth, London, for improvements in apparatus for hatching eggs and raising the young; and for heating hot-houses and other buildings.—Sealed 26th February.

William Nairne, of Millhaugh, in the county of Perth, flax-spinner, for a new mode or new modes of propelling carriages along railways.—Sealed 2nd March.

David Zoolow Stewart, of Montrose, iron-founder, for improvements in moulding iron and brass.—Sealed 2nd March.

Juan Nepomuceno Adorno, of Mexico, for improvements in manufacturing cigars, and other similar articles.—Sealed 2nd March.

John Harcourt Brown, of Brunswick-place, Barnsbury-road, London, for improvements in securing letters, envelopes, covers, despatches, packets, and parcels.—Sealed 2nd March.

Henry Dircks, of Nicholas-lane, London, engineer, for improvements in the means of obtaining and preparing extracts from vegetable matters, and in the apparatus connected therewith, which apparatus may be also applied to other similar purposes. —Sealed 4th March.

Charles Hague, of Oldham, brass-founder, and William Madeley, of Manchester, machine-maker, for improvements in, or applicable to, certain machines employed in the slubbing, roving, or preparing to be spun, of cotton and other fibrous substances; and an improved apparatus for lubricating shafts and bearings of, or in, such machines, for the purpose of reducing friction, and which apparatus is also applicable to other shafting, and machinery.—Sealed 9th March.

Elisha Hayden Collier, of Goldsworthy-terrace, Rotherhithe, civil engineer, for certain improvements in the manufacture of nails, and in the machinery or apparatus to be used for such purposes.—Sealed 10th March.

Erastus B. Bigelow, of Boston, State of Massachussetts, United States, for certain new and useful improvements in looms for weaving certain kinds of carpets or other fabrics of like character.—Sealed 11th March.

John Thomas Perkins, of Monmouth-street, London, pattern card maker, for certain improvements in machinery or apparatus for cutting paper and other fabrics.—Sealed 11th March.

William Edward Newton, of the Office for Patents, 66, Chancery-lane, London, civil engineer, for improvements in the preparation or manufacture of thread or yarn,—being a foreign communication.—Sealed 12th March.

James Palmer Budd, of Ystalyfera ironworks, Swansea, merchant, for improvements in the manufacture of iron,—Sealed 13th March.

New Patents

SEALED IN ENGLAND.

1846.

To John Samuel Templeton, of Sussex-place, Kensington, artist, for improvements in propelling carriages on railways; and improvements in propelling vessels. Sealed 27th February—6 months for inrolment.

Peter Armand Le Comte de Fontainmoreau, of New Broad-street, London, for a new mode of manufacturing and glazing cotton wadding, and its application to the making of mattresses,—being a communication. Sealed 28th February—6 months for inrolment

James Soutter, of Limehouse, engineer, for an improved pump, applicable to steam-engines or other purposes. Sealed 2nd March—6 months for inrolment.

John Fuller, of Beacham Well, in the county of Norfolk, farmer, for improvements in apparatus for sowing corn or other seeds. Sealed 5th March—6 months for inrolment.

William Nicholson, of Manchester, engineer, and George Wardsworth, of Sutton Glass Works, in the same county, manager, for certain improvements in the manufacture of glass and other vitreous products. Sealed 5th March—6 months for inrolment.

Robert Lewis Jones, of Chester, railway agent, for improvements in reducing charcoal and other similar matters to powder, and in treating the same when in a state of powder, so as to render them suitable to be used in place of vegetable black, drop black, lamp black, and other matters. Sealed 5th March—6 months for inrolment.

Robert Warrington, of Apothecary's Hall, in the city of London, chemist, for improvements in preserving animal and vegetable substances. Sealed 5th March—6 months for inrolment.

William Green, of Hyde, in the county of Chester, baker, and Mark Walker, of the same place, grocer, for certain improved apparatus for facilitating the putting on of boots to the feet. Sealed 11th March—6 months for inrolment.

Godfrey Woone, of Kensington, in the county of Middlesex, Gent., for certain improvements in the art of engraving in relief. Sealed 11th March—6 months for inrolment.

Jean Joseph Ernest Barruel, of No. 172, Rue St. Jacques, in the city of Paris, chemist, for improvements in working of certain sulphurets to transform them into metal or oxides, and to collect the latter, also to collect the oxides from oxidized ores equivalent to these sulphurets. Sealed 11th March—6 months for inrolment.

William Nairne, of Millhaugh, in the county of Perth, North Britain, flax spinner, for a new mode, or new modes of, propelling carriages along railways. Sealed 11th March—6 months for inrolment.

Parfait Grout, of Rouen, in the kingdom of France, but now residing at Leicester-street, Leicester-square, in the county of Middlesex, doctor of medicine, for improvements in the manufacture of plaster of Paris, lamp-black, and coke,—being a communication. Sealed 11th March—6 months for inrolment.

Henry Austin, of Walbrook, civil engineer, and Joseph Quick, of Sumner-street, Southwark, engineer, for improvements in the construction of railways and railway carriages and conveyances. Sealed 11th March—6 months for inrolment.

Frederick Grace Calvert, of Paris, in the kingdom of France, for improvements in the preparation of the article called "Jute," rendering the same suitable for various useful purposes. Sealed 11th March—6 months for inrolment.

William Price Struve, of Swansea, civil engineer, for improvements in ventilating mines. Sealed 11th March—6 months for inrolment.

Erastus B. Bigelow, of Boston, in the State of Massachusetts, for certain new and useful improvements in looms for weaving certain kinds of carpets or other fabrics of like character. Sealed 11th March—6 months for inrolment.

George Hinton Bovill, of Millwall, and Robert Griffiths, of Havre, in the kingdom of France, engineers, for improvements in apparatus applicable to the working of atmospheric and other railways, canals, and mines; and improvements in transmitting gas for the purpose of lighting railways and other places. Sealed 11th March—6 months for inrolment.

Benjamin Shaw, of Bradford, in the county of York, overlooker, for improvements in preparing for spinning worsted and other yarns. Sealed 11th March—6 months for inrolment.

Thomas Vaux, of Frederick-street, Gray's Inn-road, land surveyor, for improvements in the manufacture of horse-shoes and horseshoe nails. Sealed 11th March—6 months for inrolment.

Charles Robert Robinson, of Strines, in the county of Derby, calico printer, and William Bowden, of the same place, mechanic, for certain improvements in machinery for washing and cleansing cotton, linen, or woollen fabrics. Sealed 11th March—6 months for inrolment.

John Banfield, of Birmingham, organ builder, for certain improvements in making signals and communications on railways, and between railway engines, carriages, and trains, which are also applicable to other localities. Sealed 11th March—6 months for inrolment.

Thomas Hancock, of Stoke Newington, in the county of Middlesex, Esq., for improvements in the manufacturing and treating of articles made of caoutchouc, either alone, or in combination with other substances, and in the means used or employed in their manufacture. Sealed 18th March—6 months for inrolment.

John Longbottom, of Edward-street, Leeds, mechanist, for improvements in the manufacture of oil cake, and in the machinery and processes for pressing and moulding the same; which machinery and processes are also applicable to the manufacturing of other articles from plastic materials. Sealed 18th March—6 months for inrolment.

Bennet Woodcroft, of Manchester, in the county of Lancaster, printer, for an extension of letters patent for the term of six years from the twenty-second day of March, 1846, being the expiration of the first term of fourteen years, for his invention of certain improvements in the construction and adaptation of a revolving spiral paddle for propelling boats and other vessels on water. Sealed 21st March—6 months for inrolment.

John Haskins Gandell, and John Brunton, of Birkenhead, civil engineers, for an improvement in the construction of and in the mode of opening and closing of moveable bridges or arches, for the purpose of carrying railways, tramways, or other roads, across canals, locks, docks, or other open cuttings. Sealed 23rd March—2 months for inrolment.

Thomas Howard, of the King and Queen Iron Works, Rotherhithe, engineer, for improvements in steam-engine condensers. Sealed 25th March—6 months for inrolment.

Robert Warington, of South Lambeth, in the county of Surrey, Gent., for improvements in the operation of tanning. Sealed 25th March—6 months for inrolment.

Thomas John Mc Sweny, of Killarney, Gent., for improvements in steering ships and other vessels. Sealed 25th March—6 months for inrolment.

George Fergusson Wilson, of Belmont, Vauxhall, in the county of Surrey, Gent.; George Gwynne, of Chester-terrace, Regent's Park, Gent.; James Pillans Wilson, of Belmont aforesaid, Gent.; and John Jackson, of South Ville, Wandsworth-road, Gent., for improvements in producing light, and in materials and apparatus applicable thereto; and in treating fatty and oily matters. Sealed 25th March.

Alexander Parkes, of Birmingham, artist, for improvements in the preparation of certain vegetable and animal substances, and in certain combinations of the same substances alone or with other matters. Sealed 25th March—6 months for inrolment.

Thomas Pope, of Kidbrooke, in the county of Kent, Gent., for improvements in apparatus for moving railway carriages on to railways, and in machinery for lifting and moving heavy bodies, —being a communication. Sealed 25 March—6 months for inrolment.

Louis Serbat, of Saint Soulve, in the Department of the Nord, in France, chemist, for a new method of constructing the roofs of houses, buildings, sheds, and all other erections. Sealed 25th March—6 months for inrolment.

William Unsworth, of Derby, silk manufacturer, for certain improvements in looms for weaving. Sealed 25th March—6 months for inrolment.

Charles Smith, of Newcastle-street, Strand, in the county of Middlesex, for improvements in cooking and culinary utensils, and methods of heating and suspending or fastening articles of domestic use, and similar purposes. Sealed 25th March—6 months for inrolment.

Joseph Needham Tayler, of Chelsea, captain in the navy, for certain improvements in propelling vessels, and also certain improvements in constructing vessels, so as to be used in combination with certain machinery or apparatus for moving sandbanks and other obstructions to navigation; part or parts of which machinery or apparatus may be used on railways, or may be adapted and applied to carriages on common roads. Sealed 25th March—6 months for inrolment.

Edward Crump Dell, of Highgate, in the county of Middlesex, surgeon, for certain improvements in apparatus for lighting the magazines and other parts of ships; applicable also for the general purposes of lighting buildings, roads, or ways. Sealed 25th March—6 months for inrolment.

Edwin Cotterill, of Birmingham, manufacturer, for certain improvements in articles applied to windows, doors, and shutters, part of which has been communicated to him by a certain foreigner residing abroad. Sealed 25th March—6 months for inrolment.

William Carpenter, of Bridge-street, Banbury, in the county of Oxford, watch-maker, for certain improvements in thrashing machines. Sealed 25th March—6 months for inrolment.

Charles Bobert Robinson, of Strines, in the county of Derby, calico printer, for certain improvements in machinery for tiering in the printing of calicoes and other fabrics. Sealed 25th March—6 months for inrolment.

Charles Iles, of Bordesley, Birmingham, machinist, for an improvement in the method of carding certain descriptions of dress fastenings and other articles; and in the fabrics employed for that purpose. Sealed 25th March—6 months for inrolment.

CELESTIAL PHENOMENA FOR APRIL, 1846.

D.	H.	M.	
1			Clock before the sun, 4m. 0s.
	—		☽ rises 8h. 36m. M.
	—		☽ passes mer. 4h. 35m. A.
	—		☽ sets Morn.
	4	2	☿ greatest hel. lat. N.
2	6	35	♃'s first sat. will em.
3	5	12	☽ in □ or first quarter
	—		Occul. λ Geminor., im. 11h. 51m. em. 12h. 49m.
5			Clock before the sun 2m. 31s.
	—		☽ rises 1h. 22m. A.
	—		☽ passes mer. 8h. 28m. A.
	—		☽ sets 2h. 57m. M.
	1		☽ in Apogee
9			Occul. *A*2 Cancri, im. 7h. em. 8h. 4m.
7	9	31	♀ at greatest brilliancy
8			Occul. *p*4 Leonis, im. 12h. 34m. em. 13h. 20m.
8	16	17	☿ stationary
9	8	30	♃'s first sat. will em.
10			Occul. 28 Virginis, im. 7h. 37m. em. 8h. 14m.
10			Clock before the sun, 1m. 22s.
	—		☽ rises 5h. 45m. A.
	—		☽ passes mer. 11h. 24m. A.
	—		☽ sets 4h. 29m. M.
11	5	55	Ecliptic oppo. or ○ full moon.
12	7	49	♃'s second sat. will em.
13			Occul. *v* Libra, im. 9h. 15m. em. 9h. 33m.
14			Occul. ψ Ophiuchi, im. 11h. 52m. em. 13m.
15			Mercury R. A. 1h. 53m. dec. 14. 17. N.
	—		Venus R. A. 22h. 52m. dec. 5. 1. S.
	—		Mars R. A. 4h. 47m. dec. 23. 33. N.
	—		Vesta R. A. 5h. 22m. dec 22. 51. N.
	—		Juno R. A. 15h. 5m. dec. 3. 11. S.
	—		Pallas R. A. 23h. 19m. dec. 2. 15. N.
	—		Ceres R. A. 1h. 10m. dec. 0. 26. S.
	—		Jupiter R. A. 2h. 57m. dec. 16. 3. N.
	—		Saturn R. A. 22h. 3m. dec. 13. 12. S.
	—		Georg. R. A. 0h. 41m. dec. 3. 47. N.
	—		Mercury passes mer. 0h. 41m.
	—		Venus passes mer. 21h. 18m.

D.	H.	M.	
15			Mars passes mer. 3h. 14m.
	—		Jupiter passes mer. 1h. 24m.
	—		Saturn passes mer. 20h. 27m.
	—		Georg. passes mer. 23. 5.
15			Clock before the sun, 0m. 3s.
	—		☽ rises 11h. 23m. A.
	—		☽ passes mer. 2h. 49m. M.
	—		☽ sets 7h. 12m. M.
17			Occul *p*1 Sagittarii, im. 12h. 23m. em. 13h. 14m.
18			Occul. *β*2 Capricorni, im. 13h. 28m. em. 13h. 48m.
18	8	24	☽ in □ or last quarter
18	21	16	☿ in inf. conj. with the ⊙
20			Clock after the sun 1m. 7s.
	—		☽ rises 2h. 16m. M.
	—		☽ passes mer. 7h. 28m. M.
	—		☽ sets 0h. 49m. A.
	11		☽ in Perigee
	15	18	♄ in conj. with ☽ diff. of dec. 6. 29. S.
21	21	11	♀ in conj. with the ☽ diff. of dec. 3. 15. S.
23	13	57	♅ in conj. with the ☽ diff. of dec. 3. 6. S.
24	12	12	☿ in conj. with the ☽ diff. of dec. 1. 5. S.
24	16	7	☿ in the descending node
25			Clock after the ⊙ 2m. 7s.
	—		☽ rises 4h. 35m. M.
	—		☽ passes mer. 11h. 47m. M.
	—		☽ sets 7h. 12m. A.
			Eclipse of the ⊙
	5	31	Begins
	6	13	Greatest Phase } Greenwich mean time.
	6	54	Ends
			Magnitude of the Eclipse, (sun's diam. = 1.) 0·277, on the Southern limb
	4	48	Ecliptic conj. or ● new moon
26	6	11	♃ in conj. with the ☽ diff. of dec. 0. 19. N.
27	16	19	☿ in conj. with Ceres, diff. of dec. 6. 57. N.
28			Occul. *m* Tauri, im. 7h. 58m.
28	3	25	Vesta in the ascending node
	19	12	♂ in conj. with the ☽ diff. of dec. 4. 55. N.
29	11	36	♀ in the descending node
29	13	5	♀ in conj. with Pallas, diff. of dec. 5. 42. N.
30			Clock after the sun, 2m. 54s.
	—		☽ rises 8h. 9m. M.
	—		☽ passes mer. 4h. 4m. A.
	—		☽ sets 11h. 54m. A.

Eclipses of the Satellites of Jupiter are not visible from the 18th day of April until the 12th day of June, Jupiter being too near the Sun.

J. LEWTHWAITE, Rotherhithe.

THE

LONDON JOURNAL,

AND

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CONJOINED SERIES.

No. CLXXIII.

RECENT PATENTS.

To JOHN SYKES, *of Hollingwood, in the county of Lancaster, machine-maker, and* ADAM OGDEN, *of the parish of Ashton-under-Lyne, in the said county, Gent., for their invention of certain improvements in machinery for preparing and cleaning wool, cotton, and similar fibrous material.*—[Sealed 8th March, 1845.]

THIS invention consists in the application and arrangement of certain machinery, by which wool, cotton, and similar fibrous material, may be prepared and cleaned, or freed from dirt, seeds, and other extraneous matter, previous to their being submitted to the action of the carding-engine, or any subsequent preparing machine.

In Plate X., fig. 1, represents the improved machine in longitudinal section; fig. 2, is a plan view; and fig. 3, a transverse vertical section of the same. The remaining figures are detached parts, drawn on an enlarged scale, for the purpose of explaining the construction of certain parts of the machine, hereinafter referred to. A, represents the fast and loose pulleys for receiving the driving-strap of the machine. The driving-pulleys are placed on a shaft, which carries the circular drum B, provided on its periphery with a series of projections or beaters *a*, which revolve in the direction indicated by the small arrow, free of the feed-rollers and the grid *f*. From the opposite end of the shaft of the drum B, motion is conveyed, by a train of spur-wheels C, to the feeding-rollers D, and feeding-cloth E, upon which the wool, cotton, or similar fibrous material, designed to be operated on by this machine, is spread carefully by hand. The feeding-rollers D, are set free of the drum-beater B, and lightly weighted by means of the lever and small weight *d*, so that the drum-beater B, cannot break the fibre of the material, but merely strikes it, and carries it forward to the surface of the endless-cloth F, which moves slowly in the direction of the small arrows. On the shaft of the drum-beater B, is placed the pulley *b*, which conveys motion, by means of a strap, to a similar pulley *c*, placed on the shaft of a smaller drum-beater G, the direction of rotation of which is the contrary to that of the drum-beater B. From the opposite end of the shaft, on which the drum-beater G, is supported, motion is again conveyed, by means of a strap from the pulley *g*, to the pulley *h*, placed on a revolving shaft, provided with the two strip-brushes H, H. From the shaft on which the strip-brushes H, H, are placed, a decreasing motion is again conveyed, through the train of spur-wheels I, to the cylinder K; the peculiar construction of which constitutes one important part of this invention, and is described with reference to figs. 4, and 5, (which shew end and side views of part of this cylinder, on an enlarged scale,) and also to the detached figures 6, 7, and 8. It consists of two or more circular discs or wheels (best seen at K, figs. 6, and 8,) keyed firmly on a shaft, and turned accurately cylindrical; and on them a series of lags or plates of iron *y*, are screwed, a space being left between each lag or plate for the admission of the combs *i*, *i*, as represented. But before the combs *i*, *i*, are attached to the cylinder, it is again turned up upon its necks to an accurate and uniform surface. On the side of these discs or wheels, to which the lags or plates *y*, are attached, circular projections or flanges are cast, with perforations, at regular distances, to receive the set-screws *p*, which carry the metal bars to which the combs *i*, *i*, are attached. These set-screws *p*, adjust the combs by nuts, in the usual manner, at the side flanges of the discs, and are tapped or screwed into the metallic bar *x*, from which they can be removed, so as to allow of the comb and bar *x*, being drawn out when the cylinder is made perfect, as will be hereafter seen. The combs and bar *i*, and *x*, being adjusted accurately and concentric with the cylinder, they are held firm, and prevented from springing by means of the wedge-shaped pieces *r*, (see figs. 6, 7, and 8,) which tendency to spring arises from the action of the nuts in screwing the bars firm to the flange of the disc upon the set-screws *p*. These pieces are forced down to a proper position against pieces of metal, rivetted to the metal bars *x*; which pieces are thicker than the comb nut-heads and washers which hold the combs to the metal bar *x*, and are fastened by a small bolt, moving in a slot or opening formed in the exterior of the disc, as seen in the drawing. The position of the combs *i*, *i*, and their appendages, will be best seen at fig. 7, the lags *y*, being removed. But when the cylinder is complete, the intermediate space between each comb is covered over by a lag or plate *y*, which, fitting accurately to the back of each comb, prevents the teeth or points giving way or receding; the points being free at the other edge of the lag or plate to admit of the material being put on for cleaning, as seen at fig. 6. Thus a perfect cylinder is formed, with a plain surface, intersected by a series of lateral openings for the insertion of the combs *i*, *i*; the teeth or points of which are kept on an exact level with the remainder of the surface; such combs being removed or replaced when required, by removing the set-screws *p*, without disturbing any other part of the construction of the cylinder K. The rotation of the comb-cylinder K, is so adjusted with respect to the revolving strip-brushes H, H, as to present a single comb to each strip-brush as they revolve in succession, so that the wool, or similar material, is brushed out and deposited on the floor, by each brush coming in contact with a comb as they pass in successive rotation; the strip-brushes necessarily moving a little faster than the combs, so as to brush off the material from the comb at the instant of the teeth of the comb passing the line of centres. This accurate movement of the combs and brushes is requisite, to avoid what is called "flocking or moiling" the wool.

The construction of the beater-drum G, is represented, on an enlarged scale, at figs. 9, and 10, in end and plan view; and the part to which the beaters are attached is seen at fig. 11. The beaters of this drum are screwed on to the disc *e*, and the intermediate spaces are made good by lags or covering. Immediately below the beater G, is placed the grid *n*, which consists of a series of curved bars, placed edgewise, and parallel to each other, as seen at fig. 10; which position of the bars allows any wool or similar material struck off the combs by the beater G, to pass over their surface, and part with any free dirt, without producing that entanglement from lashing round the bars of the grid, which takes place when the bars are in the opposite direction.

Referring to figs. 1, and 2, L, represents an endless cloth, which has a slow motion imparted to it from the shaft of the drum-beater B, by means of a strap, and the train of wheels M; one of the carrying-rollers of such cloth being placed immediately over the feed-cloth E, and the other near to the beater G, as best seen at fig. 1. N, is a small revolving ribbed roller, for striking off any wool, cotton, or other fibrous material, which may adhere to the cloth L. On the opposite end of the shaft of the comb-cylinder K, to that from which it is driven, is placed a spur-pinion gearing into a train of spur-wheels. This train of wheels imparts motion to the endless-cloth P, and to the circular brushes Q, and R, and also a slow rotation to the card-roller S.

Supposing, therefore, the machine to be put in motion, and regularly fed with wool, cotton, or similar fibrous material, the action will be as follows:—The material placed on the feed-cloth E, will be first passed through the feed-rollers D, and subjected to the action of the beater-drum B, taking out a certain amount of dirt, seed, and other extraneous matter, which falls through the grid *f*, upon the floor.

As before remarked, the feed-rollers D, are set free of the beaters *a*, and only lightly weighted, so that the staple of the material is not broken; and any substance which adheres to the fibre is not forcibly beaten out, but is rather drawn forward and delivered, along with the partially cleaned material, on to the endless-cloth F. The cloth F, carries the material forward to the revolving-brush Q, which takes it up and delivers it to the combs *i, i,* before described, which revolve with the cylinder K, at a slightly increased speed to that of the brush Q; these combs drawing the material through the brush Q, clear it of a further amount of dirt, seed, or other extraneous matter, which falls on the floor. It should be remarked, that the combs being set level with the surface of the cylinder K, it is, by the elasticity of the brushes Q, and R, that the material is forced in, and placed on the comb-teeth *i, i.* The material being now placed in the revolving combs *i, i,* is carried forward to the carding-roller S, which, moving in the same surface direction (but much slower), opens, straightens, and regulates the amount of material in each comb, arresting and holding back a portion when the comb is overloaded,—care being taken to set the card S, so free as not to take too much of the material, or stretch or break the fibre. From this point the combs proceed forward, each with a portion of wool, while the portion which was arrested by the card S, is again taken off by the revolving brush R, and replaced in the next comb, which passes in contact with the brush R. Thus the amount, in each comb, is equalized, and proceeds forward to the beater O; and at this point one of the most important features of the invention is brought into operation. The wool or other fibrous material suspended in the comb *i, i,* in a partially clean state, is struck by the beaters in the drum O; and any dirt, seed, or other extraneous matter, which is sufficiently loose to part from the fibre, leaves it, and falls through the grid *n*, into the receptacle V; the material then proceeds forward in the comb, in a prepared and clean state, to the point where such comb comes in contact with one of the strip-brushes H, which, revolving in the same surface direction as the comb, brushes out the material, and deposits it, in a finished state, on the floor

Supposing a portion of wool, or similar fibrous material, in which the dirt or other extraneous matter could not be struck out without breaking the fibres and injuring the staple of the material, to be brought by one of the combs *i*, under the action of the beater G,—then the support of the combs not being sufficient to allow of their resisting such force, instead of the fibres being broken, the material will be drawn out of the comb, and carried backward, by the beater, over the grid *n*, and deposited on the endless-cloth L. By the traverse of the cloth L, this unfinished material is carried backward or returned, and re-delivered on to the feed-cloth E, where the whole process is recommenced; the ribbed roller N, forcing off any material which may adhere to the cloth. Thus, by repeated operations, the dirt, seed, or other extraneous matter, is sufficiently loosened to leave the material without any injury to the fibre, while the discriminating property of the machine, arising from the combined action of the comb-cylinder K, and the beater-drum G, sorts or selects such portion of the material as is in a prepared and clean state to proceed forward to the strip-brush H, at the same time that it rejects and sends back such portion as is not finally prepared and cleaned to the endless cloth L, and thence to the feed-cloth E, in order that it may go through the same process over and over again until it is in a state to part freely with the dirt, seed, or other extraneous matter, and proceed forward, in a prepared and cleaned state, to the final deposit at the end of the machine.

The patentees claim, Firstly,—the general construction, combination, and arrangement of machinery, whereby the material, under operation, is subjected to the several and successive processes of beating and selection, as above described. Secondly,—the peculiar construction and arrangement of the drum-beater B, and of the beaters *a*, whereby the material is beaten as delivered from between two slightly-weighted rollers, as above described. Thirdly,—the peculiar construction of the comb-cylinder K, for receiving, retaining, and delivering the material under operation, as above described.—[*Inrolled in the Inrolment Office, September,* 1845.]

To RICHARD ARCHIBALD BROOMAN, *of Fleet-street, in the city of London, Gent., for certain improvements in the preparation and application of artificial fuels, mastics, and cements,—being a communication.*—[Sealed 11th March, 1845.]

THIS invention consists in the preparation of artificial fuel, mastics, and cements from the substance called gutta-percha, either alone or combined with other materials, and in the application of the mastics and cements to a variety of purposes.

In the manufacture of artificial fuel, the gutta-percha is used in the rough state, as imported, for the purpose of combining the small pieces of coal or coal-dust into masses. The patentee describes five kinds of fuel:—The first kind is made by adding gutta-percha to the ordinary materials (small coal and the pitch made from coal-tar) in the proportion of 10 or 20 parts of the former to 80 or 90 parts of the latter. The second kind consists of 7 parts of gutta-percha, 8 of small coal, 4 of saw-dust, and 1 of coal-tar or pitch. The third sort is composed of 3 parts of gutta-percha and 1 of rectified coal tar; the object being to obtain by the burning of the same a black pigment, suitable for the manufacture of printing ink. The fourth description of fuel, which is to be used for the same purpose as the preceding, is made of gutta-percha and caoutchouc, in equal proportions. The fifth kind of fuel is to be used for the same purpose, and is composed of gutta-percha alone.

The gutta-percha is prepared for the manufacture of mastics and cements by the action of a cleansing or washing machine (represented in the sectional view, fig. 1, Plate XI.,) which frees it from the foreign matters usually mixed with it. The machine consists of a tank *a*, filled with water to the line 1, 2; which water is kept at from 180° to 200° Fahr., by the admission of steam or hot water into the space *b*, between the inner and outer casings of the tank. *c, c*, are two steel or iron rollers, immersed about three-fourths of their depth in the water. *d*, is a pinion through which motion is transmitted from a steam-engine or other first mover to the wheel *e,* on the axis of one of the rollers; and from this axis motion is communicated by the wheel *f,* fastened thereon, to the wheel *g,* fixed on the axis of the other roller. The gutta-percha is soaked in hot water for a short time, to render it pliable, and is then passed between the rollers *c, c,* until all the foreign matters have been squeezed out.

The gutta-percha, thus prepared, may be applied as a mastic or cement in one of three states, viz., a plastic state, a granular or pulverized state, or a state of solution, and either alone or combined with other substances. When the gutta-percha is to be employed in the plastic state, it is submitted to the action of the kneading machine shewn, in section, at fig. 2. *a,* is the framework, in which is mounted a cylinder *b,* containing a grooved roller *c;* the upper part of the cylinder is hinged at *d,* in order that it may be opened for the introduction of a mass of gutta-percha *e,* of sufficient size to fill about one-third of the space between the roller *c,* and the interior of the cylinder *b,* and formed by working together a number of the cleansed pieces in hot water, by hand. After the introduction of the gutta-percha, the roller is caused to rotate, and its flutes not only carry round the gutta-percha, but also knead it thoroughly. The heat ultimately evolved in the process is considerable; but it will, in most cases, be found necessary to aid the process at the commencement, by enclosing the case *a,* in a tank of hot water, or by admitting steam into the cylinder *b,* through openings *f,* at the top.

If the elasticity of the gutta-percha is required to be increased, the patentee incorporates with it, while going through the kneading machine, a portion of caoutchouc, or of sulphur, or portions of both; the relative proportions of the different materials are, 3 parts of caoutchouc to 6 of gutta-percha, or 1 of sulphur to 8 of gutta-percha, or 2 of caoutchouc and 1 of sulphur to 6 of gutta-percha. When caoutchouc is used, a degree of heat exceeding 150° Fahr. is requisite to effect the amalgamation of the two substances; the caoutchouc may be introduced into the machine with the gutta-percha; but the sulphur should be dropped in through the openings *f,* in small quantities at a time. Any color may be given to the mass, by introducing the coloring matter in the same manner as the sulphur; it may be also made more smooth, by incorporating with it some pulverized French chalk or other soft powder; or it may be rendered rough, by the addition of ground emery, sand, or other hard substance, in a granular state.

The gutta-percha, prepared in the above manner, may be employed by itself or in combination with other materials. If used alone, it may be manufactured, by moulding, stamping, embossing, casting, or other processes, into various articles of use, as glass and picture frames, cornices, mouldings, and other architectural ornaments, panelling, mosaics, &c., buttons, studs, counters, labels, balls, &c., bracelets, armlets, garters, rings, and other circular articles, reins, bridles, belts, bands, &c. Or it may be used for any purpose for which an elastic air and waterproof substance, unaffected by ordinary degrees of heat, is suitable; for example, as a material in which pictures may be produced in relief and intaglio, as a covering for beds, couches, and cushions, as a material for billiard-table cushions, as a substitute for metallic springs, as a bearing for railway chairs and rails and parts of machinery, or as a material for atmospheric-railway and other valves.

When used in combination with other materials, the gutta-percha may serve to cement them together or render them air or waterproof. The articles of manufacture to which the gutta-percha, prepared as above, is most usefully applicable are, single and double fabrics of cotton, wool, and other fibrous materials, leather and other membranous textures, table-covers, floor-cloths, goods' wrappers, tarpaulings, printers' blankets, lappings for the cylinders and bowls of printing and embossing machines, driving bands, &c. In this class of applications, the gutta-percha may be applied in a state of solution to the articles, by means of the machine shewn at fig. 3. *a*, is the framework; *b*, *c*, two hollow iron rollers, revolving in suitable bearings, and heated by steam to 140°; *d*, a gauge, heated by steam, hot water, or hot air, and under which the gutta-percha is fed from behind. The piece of cloth or other article to be coated, is laid in a hollow ledge *e*, from whence it is carried forward over the roller *b*, and under the roller *c*, to the roller *f*, on which it is wound. During the progress of the cloth under the gauge it becomes coated with a layer of gutta-percha.

When the gutta-percha is applied in the plastic state, an arrangement, such as that represented on the right-hand side of fig. 3, may be adopted. In this case, the cloth or other article to be coated, is wound on the roller *g*, and passes from thence round the roller *c*, to the roller *f*. The mass of gutta-percha *h*, is placed on the roller *b*, immediately behind the gauge, when the warmth of the roller causes a portion of the gutta-percha to adhere thereto; this portion, as it passes under the gauge, is smoothed and reduced to a thin sheet, and becomes combined with the cloth as it passes between the rollers *b*, *c*.

In the above combinations, the plastic gutta-percha is either superimposed upon or interposed between surfaces; but there are other combinations in which the plastic gutta-percha is intimately mixed with other materials: for example, an addition may be made to the gutta-percha, while in the kneading-machine, of paper-pulp, wood-dust, leather-dust, hair, bristles, oakum, &c. (those substances which are not in a pulverized state being cut into very small pieces); and compound fabrics will be thus produced, suitable for paving, roofing, sheathing, &c.

When gutta-percha (either plain, sulphurized, or colored,) is to be employed in the granular state, it is rasped to a powder, and then applied to the production of casts of busts, cornices, and other works, in round or curved forms, and for taking impressions in relief from flat surfaces, engraved in intaglio or perforated to any given pattern. If casts of busts, &c., are to be taken, the mould is filled with the powdered gutta-percha, and heat applied until it is sufficiently ductile to be pressed into all parts of the mould. If impressions in relief from flat surfaces, engraved or perforated, are to be taken, the surface is laid on a flat table, and the powder sprinkled rather thickly over it; a straight-edge is then drawn across the surface, to cause the sunken parts to be filled, and remove any superfluous portions from the raised parts; after which, the surface is subjected to a heat sufficient to soften the gutta-percha, and the piece of cloth, leather, paper, or other substance, that is to receive the impression, is laid on the surface; pressure being then applied, by a roller or otherwise, the gutta-percha leaves the sunken parts, and attaches itself to the cloth or other substance, thus producing an exact copy, in bold relief, of the original subject.

With regard to the employment of gutta-percha, in a state of solution, the patentee states, that it may be dissolved in most of the essential oils, and by the application of a gentle heat; he prefers to use for this purpose rectified naphtha or rectified oil of turpentine. It may be employed in this state either alone or mixed with sulphur, caoutchouc, colors, French chalk, or any other of the substances above mentioned, for rendering articles air and water-proof, and cementing them together. It may be formed into sheets by floating it upon plates of glass, slabs of polished slate, or any other flat and smooth surface, and leaving it to cool and dry; if preferred, the plates or slabs may have patterns engraved on them, which will be transferred to the sheets of gutta-percha. The gutta-percha may also be applied, in the state of solution, to the better coating and protecting of articles that have been previously treated with caoutchouc, either simple or sulphurized, or any other air or water-repellent substance or preparation, or for preventing the stickiness peculiar to unsulphurized caoutchouc; likewise for saturating cordage of all sorts; as a size for stiffening silks, ribands, and other fabrics; and, mixed with colors, for printing silk, cotton, and other fabrics, leather, &c.;—in all cases it should be applied in a warm state, especially when mixed with colors and used for printing. A fabric, suitable for sheathing, roofing, and similar purposes, may be made by saturating a fleece or bat of cotton, wool, or other fibrous material, with a solution of gutta-percha, or of gutta-percha and caoutchouc, or a mixture of gutta-percha, caoutchouc, and coal-tar or pitch, either with or without a preparatory sizing.

If the addition of sulphur, during the process of kneading, or when the gutta-percha is in a state of solution, should have been omitted, or if any article, manufactured of gutta-percha or of gutta-percha and other substances combined, should be required to have additional and more permanent elasticity, it may be sulphurized by steeping it in melted sulphur, at a heat of about 300° Fahr., or by exposing it to the fumes of heated sulphur.

The patentee claims the employment, in the manufacture of artificial fuels, mastics, and cements, of the natural resin, resin-like substance, or mastic, called gutta-percha, sometimes gutta-tuban, in the manner before described; and the application of such artificial fuels, mastics, and cements, to the various purposes, and in the several states and modes before stated and exemplified.—[*Inrolled in the Inrolment Office, September,* 1845.]

To Moses Poole, *of Lincoln's-inn, in the county of Middlesex, Gent., for improvements in rails for railways,—being a communication.*—[Sealed 6th October, 1845.]

This invention consists in so constructing rails for railways, that the wheels of the locomotive engines may travel on wood, and the wheels of the railway carriages on metal.

Figs. 1, and 2, in Plate X., represent transverse sections of the improved rails, with portions of the wheels resting thereon. *a, a,* are wooden rails, on which the wheels *b, b,* of the engine run, so as to take advantage of the adhesive properties of the wood; and the wheels of the engine being thus removed from off the metal rail will not be so liable to slip, particularly in damp weather, as has been hitherto the case. *c, c,* are iron rails on which the wheels *d, d,* of the carriages travel; and thus only the same resistance will be presented to their progress as when the ordinary edge-rails are used. The rails *c, c,* are fixed to the top inner angles of the wooden rails *a, a,* by screws, or other convenient means; and if guide-wheels are used, instead of flanges to the ordinary wheels, for retaining the engines or carriages on the rails, such guide-wheels will come in contact with the rails *c, c.* In fig. 1, the engine-wheel *b,* is without a flange, and is kept in position by means of guide-wheels; in fig. 2, both the wheels *b,* and *d,* are deprived of flanges, and are kept upon the rails by guide-wheels, working in the manner represented at *e*.

The patentee does not confine himself to the above details, so long as the peculiar character of the invention be retained, whereby wood and metal rails are so combined, with reference to the axles of the locomotive engines and of the railway carriages, that the wheels of the locomotive engines may run on wood rails, and the wheels of the railway carriages may run on metal rails.—[*Inrolled in the Inrolment Office, April,* 1846.]

To THOMAS RUSSELL CRAMPTON, *of Southwark-square, in the county of Surrey, engineer, for improvements in locomotive engines and railways.*—[Sealed 6th October, 1845.]

THE first part of this invention consists in arranging a locomotive engine in such a manner as to include the tender within the same frame.

Fig. 1, in Plate XII., represents an elevation of an engine so constructed. *a*, is an upright tubular boiler, carried by the same framing as the tender *b*, which holds a supply of coke and water; *c, c*, are the cylinders fixed to the tender; and *d, d*, the driving-wheels. The position of the engine-driver is between the boiler and tender.

The second improvement in locomotive engines consists in employing external cranks or excentrics for working the slides, instead of excentrics fixed on the axle inside the wheels. *e*, in fig. 1, is a bearing generally called the crank-pin, from which an arm is returned to the required position, provided with a bearing *f*, for moving the slide when the engine is going in one direction; and to the bearing *f*, another arm is fixed or formed in one piece therewith, having a bearing *g*, for the purpose of moving the slide in the reverse direction. Small excentrics may be used instead of the bearings *f*, and *g*.

The third improvement consists in altering the shape of the fire-box, so as to increase the length of the tubes as well as to extend the area of the fire-grate. In fig. 2, the top of the fire-box is contracted longitudinally in proportion to the amount of increase required in the length of the tubes; but if it should be required to preserve the length of the top of the box, and increase the length of the fire-bars *a*, it is only necessary to extend the bottom of the fire-box, as seen in fig. 3, either at one of the ends *b*, or both of them, according to circumstances.

The last part of this invention consists in the application of a wooden rail outside the ordinary iron rail of a railway (or in any more suitable position), in order that the driving-wheels of the locomotive engine may travel upon the wooden rails, whilst the wheels of the carriages run upon the iron rails: by this arrangement the great adhesive qualities of wood are employed advantageously, without an increased tractive force being required to overcome the friction which would be produced by the whole of the wheels moving on the wood. The wooden rail should be about one-fourth of an inch higher than the iron rail.

The patentee claims, Firstly,—the combination of an upright tubular boiler with tender, having outside cylinders in one frame. Secondly,—the use of returned excentrics projecting from the crank-pin or main connecting-rod bearings, for the purpose of working the slide-valves of locomotive engines, as above described. Thirdly,—the means of increasing the length of the tubes, by bringing them into the fire-box, as well as extending the bottom of the fire-box, as described. Fourthly,—the combination of wooden with iron rails; the driving-wheels being constructed to run upon the wood, while the remaining wheels run upon the iron.—[*Inrolled in the Inrolment Office, April,* 1846.]

To THOMAS HOWARD, *of the King and Queen iron-works, Rotherhithe, in the county of Surrey, iron manufacturer, for improvements in rolling iron bars for suspension bridges and other purposes.*—[Sealed 6th October, 1845.]

THIS invention consists in a method of rolling wrought iron bars with heads or increased breadths thereon, in one entire piece, so as to avoid the uncertain and insecure process of welding such heads on to the bars.

The slab, faggot, or shingle, from which the bar is to be produced, is heated in a furnace, and passed between grooved or other rollers, in the usual way, to form the elongated slab shewn in plan and edge view at fig. 1, Plate X; this slab is then carried to the heading rollers represented at fig. 2, and passed between them edge first or sideways, until the enlarged parts or collars of the rollers have pressed out the ends of the slab to the extent required for forming the heads as seen at fig. 3, while the intermediate part of the slab remains uncompressed; after which the slab is brought to the required length and thickness by plain or finishing rollers, and will then only require to have its ends trimmed and holes bored therein, as indicated by the dotted lines in fig. 4.

When the bars are large, the patentee prefers that the heading rollers should have a to-and-fro or reversing motion given to them, in order to expedite the rolling out of the heads, in conjunction with the other operations, and to render a second heating of the slab unnecessary.

The patentee claims the manufacture of bars with heads or enlargements, by means of rollers, for suspension bridges or other purposes.—[*Inrolled in the Inrolment Office, April, 1846.*]

To William Hunt, *of Dodderhill, in the county of Worcester, brickmaker, for improved apparatus to be used for burning coal; also improved apparatus to be used for applying heat to effect evaporation of certain solutions.*—[Sealed 16th January, 1845.]

This invention consists, firstly, in an improved construction of furnace, by the use of which an economical combustion of coal is effected; and secondly, in improved apparatus for effecting the evaporation of saline solutions, and which apparatus are more particularly applicable to the evaporation of brine or solutions of common salt, but may with certain modifications (to suit particular circumstances) be also employed for evaporating other solutions. In Plate XI., figs. 1, and 2, shew the improved furnace for effecting the combustion of coal; fig. 1, being a longitudinal vertical section thereof; and fig. 2, a transverse vertical section taken through the dotted line 1, 2, of fig. 1, looking to the right.

A, is a chamber made with inclined sides for the reception of coal, which is introduced through an opening B, provided with a door or stopper for closing the same. C, is a floor or hearth, on which the coal is supported. D, is a series of bars forming what may be called the grate of the furnace, through which a supply of atmospheric air passes. This grate is formed of loose fire-bars D, D, the upper ends of which are hooked for the purpose of suspending them from the upper long horizontal bar *b*, *b*, which is supported in slots or grooves *c*, *c*, made in the side walls of this part of the apparatus, as seen in fig. 1. The lower parts of the fire-bars rest against a similar long horizontal bar *d*, which is placed a little in advance of the upper bar *b*, and consequently holds the fire-bars in an inclined position. The ends of the bar *d*, are also supported in slots similar to the upper bar, and by moving these bars along the slots nearer to or further from the lower end of the chamber A, the thickness of the fire, and consequently the quantity of coal in a state of ignition at one time, is diminished or increased, as will sometimes be required, according to the nature of the coal and the amount of draft. E, is a passage by which the products of combustion proceed from the furnace. The exit of this passage should be considerably narrowed in order to give good effect to the draft, and to facilitate the combustion of the gases. F, is a narrow channel or air passage open to the atmosphere, and communicating with the passage E: through this channel a proper supply of atmospheric air is admitted, to effect the combustion of gases proceeding from the coal. G, is a damper, for regulating the quantity of atmospheric air to be admitted. This apparatus is preferred to be constructed of fire-bricks, the upper part being enclosed in a casing of iron plates, marked H, in order to prevent the escape of the gases which are generated from the coal in the chamber A, becoming heated; and luting is applied to the stopper B, for the same purpose. When the improved furnace is used for burning coal to generate steam in steam-boilers, the patentee prefers having a double casing of iron plates, forming a water and steam-chamber, enclosing the upper portion of the furnace, and having this chamber connected with the steam-boiler, to which the improved furnace is applied.

In commencing to use the improved furnace, a quantity of burning coal is first placed on the floor C; a further supply of coal is then introduced through the opening B, on to the top of the already ignited fuel, until the chamber A, is nearly filled. The opening B, is now closed, and air is supplied to the burning coal on the floor C, between the fire-bars. A sufficient space is provided between the lower ends of the bars D, and the floor C, to admit of clinkers and ashes being withdrawn from the furnace when requisite. The passage E, serves to conduct the flame and heated air, produced by the ignited fuel, into contact with a steam-boiler, evaporating vessel, or other apparatus to which heat is required to be applied; and a suitable draft is obtained by means of a chimney, or by other means, as is well understood.

One of the principal advantages resulting from the use of this improved method of effecting the combustion of coal is, that, by the peculiar construction of the apparatus, the gases and other products of combustion may be effectually consumed, without reducing the temperature by the admission of cold air immediately in contact or contiguous with the surfaces that it is required to heat, as is the case in most ordinary furnaces; for, in this improved apparatus, the atmospheric air is admitted through the opening F, into the passage E, where it enters into the midst of the gases, and, owing to the intense heat of the red-hot brick-work, its temperature is immediately raised, and the passage E, being flat, a perfect admixture and consequent perfect combustion of the gases takes place, and a flame of intense heat rushes out from the contracted opening of the passage E, to the place where the heat is to be applied. If the atmospheric air were caused to mix with the gases in a situation where the contiguous surfaces are comparatively cool, the temperature of this part of the apparatus would not be sufficient to cause a perfect combustion of the gases; whereas, by the employment of brick-work, which may be allowed to get red hot, the gases are as effectually consumed when contiguous to these surfaces as they would be in the centre of the passage or flame itself.

The patentee next describes his improvements for effecting the evaporation of saline solutions. One object of this part of the invention is, to prevent the access of currents of cold air to the bottom of the pans used for evaporating saline solutions; such currents of air being very prejudicial to economy, as the temperature of the pans is sometimes considerably reduced. For this purpose the patentee employs certain arrangements of apparatus, which are thus described:—Fig. 3, is a section of part of a salt-pan, with one of the improved plans for preventing the access of cold air underneath such pans. A, is a portion of a salt-pan; B, is a wall of brick-work, supporting the pan, and having a set-off, as shewn at *b*; C, is a bent plate, extending the whole length of the pan, and resting on the set-off *b*; D, is a clamp or hook of iron, attached to the plate C, for tying this plate to the brick wall B, (a number of these clamps are used, at distances of about two feet from each other); E, is a plate of pliable or flexible metal, such as lead, zinc, or copper, extending the whole length of the pan, and attached by its lower part to the plate C, having its upper part turned over the edge of the pan A, and caused to descend about three inches therein (but it is preferred that this plate E, should not descend so low as to touch the brine contained in the pan A). The pliable or flexible plate E, adapts itself, by its own weight, to the upper edge of the pan A, and its pliability admits of the pan A, moving or rising, to a certain extent, upon the brick-work B, without permitting the access of an injurious quantity of air between the upper edge of the pan and the pliable plate E; the free access of air underneath the pan is by this means prevented.

Fig. 4, is a section of part of a salt-pan, shewing another mode of preventing the access of air underneath the pans. A, is a portion of a salt-pan; B, is a wall of brick-work, supporting the pan; C, is an iron plate, attached to the lower part of the pan, extending its whole length, and projecting about one foot below the bottom of the pan; D, is an iron plate, extending the whole length of the pan, and secured in the floor E, of the salt-pan house; F, is a connecting-piece, formed of some pliable or flexible material (such as canvass or lead), which serves to connect the plate C, with the plate D. The connecting-piece F, is attached to the plates C, and D, by means of screw-pins or cotters passing through the plates, and through a strip of iron or wood, placed over the pliable material, and extending its whole length. The width of this connecting-piece F, is such as to admit of its lying in folds between the two plates C, and D, and thereby provide for the pan A, moving or rising on the brick-work B; and the texture of the said connecting-piece is sufficiently close to prevent the access of an injurious quantity of air underneath the pan, which would otherwise take place when the said pan rises or moves on the brick-work, and thereby creates an opening between the pan and brick-work.

Fig. 5, is a section of part of a salt-pan, with the improvement for preventing the access of air underneath the pans. A, is a portion of a salt-pan; B, is the floor of the salt-pan house; C, is an iron plate, attached to the lower part of the salt-pan, extending its whole length, and projecting about two feet below the bottom of the pan; D, is a bent iron plate, attached to the plate C, and extending its whole length; E, is a wall of brick-work, supported on the plate D, and serving to protect the plate C, from the action of the flame passing under the pan. F, represents a mound or quantity of flue-dust or ashes, placed against the plate D, to prevent the access of cold air under this plate; but which mound of flue-dust or ashes does not prevent the pan from moving or rising on its seating.

In this arrangement the salt-pan is supported on pillars of brick-work or iron, in the manner frequently adopted.

The improvements in preventing the access of air under salt-pans has been described as applied to only one part of such pans, but it is obvious that to obtain the desired effect it will be necessary to apply these improvements, or some of them, to the lower part of the said pans, wherever cold air from the atmosphere may obtain access underneath the same.

Another improvement relating to the evaporation of saline solutions is, to communicate heat to the saline solution to be operated upon, previously to its being introduced into the evaporating pan; the heat so communicated is derived from the heat passing through the flues, leading from the fire-place under the evaporating pan to the chimney. This object is effected by means of the apparatus shewn at figs. 6, and 7; fig. 6, being a longitudinal section, and fig. 7, a transverse section of a salt-pan, with the improvements applied thereto. A, is the salt-pan; B, is the fire-place; C, the flue under the salt-pan; D, the flue leading from the salt-pan to the chimney; E, an annular vessel, formed of two cylinders, into which cold brine is introduced by means of a pipe F. The heated air passing from under the salt-pan A, surrounds the vessel E, and also passes through its interior cylinder, thereby communicating heat to the brine contained therein. G, is a pipe through which the heated brine is conducted into the salt-pan A, at such part thereof as may be preferred. It will be obvious that the same effect may be produced by having a number of tubes placed in the flue D; which tubes may be supplied with cold brine, and have an arrangement to conduct the heated brine into the salt-pan A.

Another object in the second part of the invention is, to prevent the salt adhering to that part of evaporating pans which is situated over the fire-place; which adhesion occasions the formation, in evaporating brine, of what is termed "pan-scale or pan-scratch." This improvement is effected by means of an arrangement of apparatus, also exhibited at figs. 6, and 7. A, is a salt-pan; B, is the fire-place; H, is a closed vessel, placed in the salt-pan, and supported upon feet, so as to keep its bottom about two inches above the bottom of the salt-pan. The vessel H, extends the whole length of the fire-place B, and its bottom is pierced with three rows of holes (of about one-sixteenth of an inch in diameter) in the direction of its length; the rows of holes being about three inches distant from each other, and the holes themselves being also about three inches distant from each other. J, is a pipe attached to the vessel H, through which brine (either in a cold or heated state) is supplied to the vessel H, and this brine escapes through the said holes in the bottom of the vessel H, on to that part of the bottom of the pan A, which is placed over the fire, and thereby prevents, to a certain extent, the adhesion of salt on the said part of the evaporating pan.

If it is thought desirable to introduce heated brine into the vessel H, the pipe G, is conducted from the annular vessel E, in the flue D, and connected either directly to the said vessel H, or furnished with a cock or tap, whereby a regular quantity of brine may be run out from the pipe G, into the funnel at the upper end of the pipe J, as seen at fig. 6.

A further object in that part of the invention which relates to the evaporation of saline solutions is, to collect the steam which is produced by evaporation at a boiling temperature, and apply such steam to effect the evaporation of saline solutions at a lower temperature.

This is effected by means of certain arrangements of apparatus which the patentee employs for manufacturing that description of common salt produced by evaporating brine at a boiling temperature, and known as "fine salt;" and also that description of common salt produced by evaporating brine at a temperature below boiling heat, and known as "broad salt."

Fig. 8, is a transverse vertical section of one of the improved arrangements of apparatus by means of which this object is effected. *a*, is a salt-pan, in which "fine salt" is manufactured, by causing brine to be evaporated at a boiling temperature; *b*, is a vessel, forming a steam collector, which encloses nearly the whole surface of the brine contained in the pan *a*; a long narrow open space on each side of the pan being left for the crystallized salt to be raked into from time to time, previous to removing it from the pan, as hereafter described; *c*, is a pipe, for conveying steam from the steam-collector *b*, to evaporating pans, containing brine, and constructed in the same manner as the evaporating pans which are commonly used for manufacturing "broad salt," by the application of heat derived from steam. The steam-collector *b*, is represented as being constructed of iron plates, covered with wood; the latter being applied for the purpose of decreasing the amount of condensation occasioned by the transmission or radiation of heat from the steam through the iron plates, when exposed to the atmosphere. c^1, is a beam, supported upon the walls of the salt-pan house; *d, d,* are moveable pieces, forming the sides of the steam-collector *b*. These sides are attached to the pieces c^2, by means of hinges, and are counterbalanced by weights hanging over pulleys, as shewn in the drawings. The hinges admit of the sides *d, d,* being lowered, so that their lowest part becomes immersed in the brine contained in the pan *a*, and allows of their being raised for the workmen to obtain access to the pan *a*, to withdraw salt: the raised position of the sides is shewn by dots in the figure. The ends of the steam-collector are attached to the beam c^1, and rest upon the bottom of the salt-pan *a*. The sides *d, d,* are connected to the ends by means of a flexible canvass joint, which is for the purpose of rendering the sides steam-tight.

A canvass covering, shewn by dots, and marked *f, f,* is also used to complete the joint between each of the sides *d, d,* and the pieces c^2, and to render these joints sufficiently steam-tight for the purpose required. These connections of canvass *f, f,* are sufficiently pliable to admit of the sides *d, d,* being moved, as hereinbefore described. *g, g,* are iron gutters, attached to the interior of the inclined sides *d, d,* for the purpose of collecting the water produced by the condensation of steam against these sides, and for conducting such water beyond the salt-pan *a*, by means of a pipe, as will be easily understood by any intelligent manufacturer.

Fig. 9, represents, in side elevation, another mode of constructing the steam-collector. Instead of the inclined sides D, D, a flat lid or covering is supported from cross-pieces C, C, which are suspended from the roof above. Moveable flaps or doors E, E, are hinged on to the flat covering, and the joint is covered over with canvass or some other suitable flexible material, as shewn at F, for the purpose of preventing the escape of the steam. The moveable flaps or doors are connected to the end-pieces by means of flexible canvass joints H, as in the other plan, so as to allow the doors or flaps to be lifted up, as shewn by dots. The doors are counterbalanced by weights attached to cords, passing over pulleys; and in order, as far as possible, to prevent the condensation of the steam, the flat covering D, is covered over with a layer or bed of coke-ashes, or other substance which is a bad conductor of heat. G, is the steam-pipe for conducting off the steam arising from the evaporating pan from the steam-collector to other evaporating pans, as above mentioned.

When it is required to rake up the salt that has been deposited on the bottom of the pan, the inclined sides *d*, of fig. 8, or the hanging-flaps of fig. 9, are to be raised into the position shewn by dots in the several figures, and then the attendants can rake the salt from the middle up to the sides of the pans, where a space is left for that purpose. When the raking is completed, the sides are let down again, and the salt can be removed at leisure from the edges of the pan by the attendants, while a further deposition is going on in the pan.

Figs. 10, and 11, represent different views of an apparatus for raking up the salt that is deposited at the bottom of the pan, without the necessity of raising any part of the covering; by which means an escape of steam and reduction of temperature is prevented. Fig. 10, is a longitudinal section, and fig. 11, a horizontal section or plan view of the same; the covering or lid of the pan being removed. A, A, is the salt-pan; B, the fire-place or furnace; C, the flue; D, D, the lid or covering of the pan, which is supported in its place by timbers or bearing-pieces E, E, but is to be considered as a fixture, it being firmly secured to the pan. As it will be occasionally found necessary to have access to the interior of the pan, doors D*, D*, are provided in the front end, large enough for a man to enter.

The raking instrument consists of a number of small rakes *a, a, a,* mounted on a horizontal rod or shaft *b,* furnished at each end with small wheels or rollers *c, c,* which run on peculiarly constructed railways *d, d.*

This raking instrument is moved backwards and forwards in the salt-pan by means of the screwed shaft *e, e;* the inner end of this shaft is furnished with two stop-pieces *f,* and *g,* and passes through and works in a hole made in the bridle-piece *h.* When the instrument is pushed forward, the stop-piece *f,* bears against the bridle-piece *h,* and the stop-piece *g,* bears against a long horizontal bar *i, i,* which passes under the small rakes and parallel with the shaft *b, b.* It will now be understood, that as the raking instrument advances, the screwed shaft *e, e,* pushes forward and raises up the horizontal bar *i, i,* and by that means raises the rakes out of the brine; but in order further to insure the rakes being raised out of the brine, a railway *d, d,* is made on each side of the pan. The end pieces of these railways are mounted on centres, and form inclined planes to conduct the small rollers *c, c,* up to the fixed stationary rail above, and down from the top-rail to the other one immediately below. The centre of one of these end-pieces is at 1, and the centre of the other is at 2; the latter piece is made or counterbalanced in such a manner that it will always remain level with the fixed part *d,* of the railway; and when the rollers of the raking instrument pass the centre 2, of the end-piece, this latter will tip over, and assume the inclined position shewn in fig. 10, until the rollers *c, c,* quit it at bottom, when it will immediately rise up again and resume its original position; that is, be on a level with the other part of the railway. By this means, this part of the rail allows the rollers *c, c,* to pass under it. When the raking instrument is drawn back, for the purpose of raking or gathering up the salt, the rollers *c, c,* pass along the lower rail *k, k,* under the upper rail, and the action of drawing the screwed shaft back withdraws the stop-piece *g,* from under the horizontal bar *i, i,* and allows the small rakes *a, a,* to drop down on to the bottom of the pan, which they will do by their own weight; then, by continuing to draw back the screwed shaft, the raking instrument will advance, gathering up in its progress the deposited salt, and be guided along the pan by the rollers *c, c,* running on the lower rail *k,* as before mentioned. When the rollers *c, c,* arrive at nearly the end of their return course, they come into contact with the under sides of the inclined end of the upper railway, which, being hung on a centre at 1, as before-mentioned, is raised up by the rollers *c, c,* in order to let them pass; and as soon as they have passed, these inclined ends assume their original position, and upon pushing back the screwed shaft, the rollers *c, c,* will run up the inclined ends *d**, *d**, of the railway to the upper rail *d*, as has been already mentioned.

When pans of large dimensions are used, it will require more power than one man can exert to work the raking instrument with facility; it is therefore necessary that some mechanical means should be devised to assist the workman. The plan adopted by the patentee consists in employing a screwed rod *e*, and passing it through a box or nut fixed in standards *l*, *l*. As the shaft will vary slightly in inclination on entering or leaving the pan, it is necessary that the screw-box at *l*, *l*, should be mounted in shackles, so as to suit itself to the incline of the shaft. The screw-box is mounted on a centre-pin which slides up and down in a slot made in the standards *l*, *l*, and two handles or arms are connected to the screw-box; by turning which handles one way or the other, the screwed rod *e*, and consequently the raking instrument, are made to advance or recede at pleasure. This rod *e*, passes through a hole at *m*, made in the back of the covering for that purpose, and the steam arising from the evaporation of the brine is conducted off through the steam-pipe at the opposite end to heat the brine in another pan.

The patentee claims, Firstly,—the peculiar arrangement and construction of apparatus shewn and described in reference to figs. 1, and 2, or any modification thereof, for effecting the regular and economical combustion of coal, and thereby obtaining an intense heat, which may be applied to various useful purposes; such object being effected by regularly supplying fuel to the grate, and atmospheric air to the gases at a part of the apparatus which is kept constantly at a red heat. Secondly,—the construction of apparatus for preventing the access of cold air underneath pans used for evaporating saline solutions; in which apparatus such access of cold air is prevented by the use of shields or guards made of pliable materials, as before-mentioned, or by the use of flue-dust, ashes, or other similar material, applied in the manner described. Thirdly,—the use of tubes or other closed vessels for communicating heat to saline solutions previously to these solutions being introduced into pans for evaporation. Fourthly,—the mode above described of preventing the injurious effects of the fire on that part of the pan situated immediately above the fire, by causing a continuous supply of fresh brine to enter in small streams into the pans through boxes or shields perforated with holes, so that fresh brine is continually flowing on to and over the bottom of that part of the pan situated immediately above the fire, and the deposit of salt thereby prevented. Fifthly,—constructing the covers of evaporating pans in such a manner that the steam may be collected and carried off therefrom, and employed for evaporating solutions in other pans; while at any time access may be had to the open pan for the purpose of removing the salt therefrom, or for other purposes, by raising a portion, or the whole of the cover; the escape of the steam being prevented by means of the flexible joints when the pan is closed. And, Lastly,—the apparatus above shewn, or any modification thereof, whereby a pan can be properly raked and the salt collected without the necessity of raising the cover or getting open access to the pan.—[*Inrolled in the Petty Bag Office, July,* 1845.]

Specification drawn by Messrs. Newton and Son.

To ARTHUR WELLINGTON PRICE, *of Manchester-street, Gray's-Inn-road, in the county of Middlesex, Gent., for improvements in the construction of anchors.*—[Sealed 17th January, 1846.]

THIS invention relates to such anchors as are made in two halves; and consists, firstly, in the application of dowels or pins to aid in keeping the parts correctly together; and, secondly, in a mode of affixing the two halves of a stock to the two halves of the shank of an anchor, so that the half anchor may be used as an anchor.

In Plate XII., figs. 1, represent the anchor complete; and figs. 2, and 3, are different views of the half anchor. *a, a,* are the two halves of the shank, each furnished with an arm and fluke; these parts are combined together by hoops *b, b,* as usual when making the shanks of anchors in parts; and in order to retain the parts more correctly together, dowels or pins *c, c,* are applied, which enter holes formed in each of the two halves: the pins being fixed in one of the halves. *d, d,* are the two halves of the stock, combined together by hoops *e, e*; but, in order that the half stocks may be securely attached to the half shanks, a dovetail groove is formed in each half of the stock to receive the half of the shank, which is made of a corresponding form; and plates *f,* are fixed on each half of the stock, so as to overlap the upper part of the shank: by these means, the half stock will be securely attached to the half shank; and the half anchor may be used as an anchor for comparatively light work.

The patentee claims, Firstly,—the application of dowels or pins to the parts of anchors, in order to aid in keeping the parts correctly together. Secondly,—the mode of combining the half stocks with half anchors, so as to enable a half anchor to be used as an anchor.—[*Inrolled in the Inrolment Office, March,* 1846.]

To CHARLES NOSSITER, *of Lyndon End, near Birmingham, for improvements in the manufacture of leather.*—[Sealed 10th October, 1845.]

THE first part of this invention relates to the manufacture of enamelled leather from sheep and lamb-skins. Instead of enamelling the grain surface of the leather as heretofore, the patentee removes the grain surface by splitting or buffing, and then produces what is technically called a "finish" upon the surface thus obtained, by means of an instrument termed a "finishing-roller," or by a glass instrument used for like purposes, or by any other convenient means; after which the prepared surface is enamelled in the ordinary manner. The patentee sometimes enamels sheep and lamb-skins on the flesh side, proceeding in like manner to that just described; first producing a finished surface, and then enamelling the same. The enamelled leather, made in the above manner, is stated to be more soft and flexible, and less likely to crack, and the enamel less liable to become cloudy, or have a bloom thereon, than when the skins are enamelled on the grain side.

The second improvement consists in shaving tanned or dressed hides and skins, by means of knives set tangentially to a rotary axis in place of performing such operation by hand. In Plate XII., fig. 1, represents a section of so much of a machine as is requisite to explain this improvement. *a*, is a roller, on which a series of knives *b*, *b*, are fixed tangentially; and although they are said to act very well when in a line with the axis, yet the patentee prefers that they should incline across the axis to a small extent, so that each blade may come progressively into action. *c*, is a bed or surface, covered with copper; but any other suitable bed may be used. *d*, *d*, are two rollers, which draw forward the skin or hide, and perform one revolution for every thirty revolutions of the roller *a*;—*e*, is a presser, which presses against the skin or hide, so as to hold the same tightly against the bed *c*.

The third improvement consists in the employment of rollers to press out the grease or oil from sheep, lamb, and other skins requiring that process. The rollers are shewn at fig. 2, with a skin passing between them; the upper roller is weighted, in order that it may exert sufficient pressure to remove the grease or oil from the skins when in the pelt state.

The last part of the invention consists in the employment of a rotary axis, furnished with knives or blades for unhairing, fleshing, and removing the grease and filth from hides and skins, instead of performing these operations by hand. In fig. 3, *f*, is a roller, having a series of blades of steel or other suitable material *g*, set radially from the axis; *h*, is a cylinder, that supports the hide or skin under operation; and *i*, is a roller, which keeps the hide or skin tightly distended, and in contact with the cylinder *h*. A rotary brush, as represented at fig. 4, is used for removing the surface grease and filth from the hides and skins.

The patentee claims, Firstly,—the mode of manufacturing enamelled leather, when sheep or lamb-skins are used, by causing surfaces thereof other than the grain surfaces to be finished, as above explained, and then enamelled. Secondly, —the shaving of hides and skins by means of a rotary axis with knives or blades affixed in an inclined or tangential direction to the circumference, as described. Thirdly,—the causing of grease or oil to be pressed out of sheep, lamb, and other skins, by means of rollers. Fourthly,—the mode of unhairing, fleshing, and removing surface grease and filth from hides and skins, as above described.—[*Inrolled in the Inrolment Office, April,* 1846.]

To JEREMIAH BYNNER, *of Birmingham, in the county of Warwick, lamp maker, for improvements in gas burners.*— [Sealed 2nd November, 1841.]

THIS invention relates to the supplying of air to gas-burners, and consists in dividing the currents of air; the object being to diminish flickering, and render the combustion more complete.

In Plate X., fig. 1, is a vertical section of a gas-burner suitably constructed for carrying out this invention; and fig. 2, is a plan view of the chimney holder. *a*, is an argand gas-burner; and *b*, the glass chimney, which is secured upon its holder *c*, by screwing on the ring *d*. The chimney holder has numerous perforations in it for the admission of air to the exterior of the flame, but is so constructed with a ring fitting closely to the burner that the air required for the exterior of the flame cannot be directed to the interior. *e*, is a perforated cylinder for admitting air to the interior of the flame, being attached to the burner by the plate *e**; which plate has a central hole for the gas tube to pass through. It will be readily understood that the supply of air to the flame will be divided by passing through the perforations in the chimney holder *c*, and cylinder *e*.

The patentee claims, as his invention, the dividing or filamenting the currents of air in their passage to the exterior and interior of gas-burners, in the manner described. He says he is aware that currents of air, in their passage to gas-burners, can be filamented by other modes than by passing them through circular holes in plates of metal; and whilst he claims the filamenting of the currents of air on the principle described, he prefers the mode of effecting it by means of circular holes in metal plates.

The preceding description applies only to gas-burners having an internal current of air on the argand principle; but he also claims the application of his invention for dividing or filamenting the currents of air to gas-burners of every description.—[*Inrolled in the Inrolment Office, May,* 1842.]

To Charles Hanson, *late of Huddersfield, in the county of York, but now of Islington, in the county of Middlesex, watchmaker, for certain improvements in clocks, watches, or time-keepers.*—[Sealed 10th October, 1845.]

This invention of improvements in clocks, watches, or time-keepers, refers more particularly to that class of time-keepers called chronometers, which are required to indicate the time with the greatest accuracy for astronomical and nautical purposes, but these improvements may be also applied with advantage to watches and clocks of the common construction.

The improvements consist, firstly, in a novel construction of detent for locking the teeth of escapement wheels; secondly, a modified construction of detent for the same purpose; and thirdly, a mode of equalizing the impulse of the escapement-wheel, so that the main-spring, whether at its greatest expansion, or smallest contraction, will always be made to give a regular impulse to the movements of the balance.

The novel construction of detent which forms the first head of the invention will be seen in elevation, on an enlarged scale, at fig. 1, Plate XII. Fig. 2, is a plan view, as looking up from below; and fig. 3, is a sectional plan of the detent taken in the dotted line of fig. 1. It is mounted vertically between the top and bottom plates of the chronometer, and for that purpose is provided with studs or centre-pins *a, a,* at top and bottom. This detent is formed of a piece of steel, turned to a true cylinder. At *b,* a portion of the shaft is cut away for about two-thirds of its diameter, thus forming a flat face for the purpose to be hereafter described. The lower part of the detent is turned to a smaller diameter, and receives upon it an arm or lever *c,* which is secured thereto. Below this lever the shaft is cut away to nearly half its diameter, and made to present a flat face *d*, to the end of a spring *e*, which is fixed to the bottom plate of the chronometer: the angle at which the flat faces *b*, and *d*, are formed, with regard to each other, will be clearly seen at fig. 2. The use of the fixed spring *e*, is to give the detent a tendency to assume one particular position, so that after the detent has been acted on by the movement of the balance-shaft or verge, it shall quickly return to its quiescent position, at which time the end of the lever or arm *c*, will point to the centre of the verge. Fig. 4, represents, in elevation, the balance-shaft or verge, with the balance-wheel *f*, at its upper end. Immediately under the balance *f*, and on the same shaft, the impulse-roller or pallet *g*, is mounted. This pallet, as is well understood, is intended to intercept the progress of the teeth of the escape-wheel (tooth by tooth) while that wheel is being urged on by the action of the main-spring. *h*, is a smaller cylinder, placed on the balance-shaft, below the pallet *g*, and at its circumference is provided with a projecting stud *i*, which acts upon the end of the lever *c*, of the detent, as will now be explained. By referring to figs. 5, and 6, the action of this part of the chronometer will be clearly seen. Fig. 5, represents the verge, the detent, and the escapement-wheel, in elevation; and fig. 6, shews them in plan view; the balance-wheel being in dots, and the detent being drawn in section, the better to shew its action. Suppose the balance-wheel to be returning in the direction of the arrow, (fig. 6,) and the teeth 1, and 2, of the escapement-wheel to be in the position shewn in the drawing, the stud *i*, of the cylinder *h*, will come in contact with the end of the lever *c*, and force the detent round part of a revolution.

The edge of the flat face *b*, of the detent will consequently be brought round to the tooth 2, of the escapement-wheel, until it clears the point of that tooth, and allows it to pass on. The escapement-wheel being thus released from its locked position, the tooth 1, will now fall upon the notch in the pallet *g*, and give an impulse to the balance. By this means the pallet *g*, will be caused to move round until the tooth 1, has cleared the notch in that pallet, when the regulating spring (not shewn in the drawing) will reverse the motion of the balance-shaft or verge, as is well understood, and bring the stud *i*, on the cylinder *h*, again into contact with the lever *c*, which lever, immediately it was released from the previous action of that stud *i*, was brought into its quiescent position by the stationary spring *e*, pressing on the flat face *d*, at the lower part of the detent. The return-action of the balance will, through the agency of the stud *i*, drive the detent lever in the opposite direction to that which it formerly took when acted upon by the stud *i*, and thus allow the stud *i*, to pass it and assume a position on the other side of the lever *c*, where it is ready (immediately upon the balance-motion being reversed) to strike again upon the detent lever and release the next succeeding tooth of the escapement-wheel from the locking of the detent, as before explained. The continued action of the escapement being merely a repetition of the movements already described, it will be unnecessary further to trace the motions of the several parts.

The improved construction of detent, which forms the second head of the invention, is shewn in the detached views at fig 7. This detent, it will be seen, consists of a flat plate of steel, provided at its upper and lower ends with pivots *a*, and a^1, by which it is supported in the chronometer; and at its centre a portion is cut away to form a notch or space *b*. Fig. 8, shews the detent, the verge, and the escapement-wheel, in elevation; and fig. 9, is a plan view of the same. The pivots of the detent are mounted in bearings, so as to allow the detent to vibrate slightly, and to rise and fall at stated intervals. Upon the lower end of the pivot a^1, a spring *c*, presses, in order to keep the detent in its highest position. The verge-shaft, which carries the balance-wheel and pallet *g*, as explained under the first head of the invention, has attached to it a small cylinder *d*, which is provided on its under face with a raised portion or inclined plane *e*,—see the detached views, figs. 10. *f*, is an arm, attached to the pivot a^1, of the detent. The escape-wheel is so placed that, when the detent is at its lowest position, the teeth of that wheel are free to pass through the notch *b*; but when the detent is raised by the pressure of the spring *c*, the nearest tooth of the escape-wheel will come against the lower edge of the notch, and cause the detent to lay flat against the side of the tooth. The action of this apparatus is as follows:—Suppose the detent to be in the position of the dotted lines of fig. 8, that is, in the locking position, and the verge to be moving in the direction of the arrow, fig. 9, the incline plane *e*, will, immediately it comes in contact with the arm *f*, force down the detent, and release the tooth 1, which will now be free to pass through the space *b*. The tooth 2, will then communicate an impulse to the pallet *g*, and escape from the notch in that pallet; but, before the tooth 1, has time to pass the pallet, the spring *c*, will have forced up the detent, and locked the next succeeding tooth (say 3,) of the escape-wheel against the lower edge of the notch *b*. In order to prevent the arm *f*, from slipping on one side and escaping the action of the inclined plane *e*, a stud or stop, rising from the bottom plate of the chronometer, is provided, which will keep the arm *f*, in a proper position to be depressed. By this arrangement the locking of the escapement is quickly and simply effected.

The third head of this invention consists in the employment of a peculiarly formed spring in place of the pallet *g*. This spring is represented, in edge view, at fig. 11, and side view, at fig. 12; but, the better to explain its action, it is shewn as applied to the first-described detent, at fig. 13; which detent may, in this instance, be placed in any convenient position to act upon the escape-wheel. A, is the verge-shaft, and to it the spring *g*, is attached, so that it shall follow the vibrations of the balance-wheel. The end g^1, of this spring has an inclination inwards, and rests against the verge-shaft, as shewn. Now, supposing the tooth 1, of the escapement-wheel to be just released from the detent, the tooth 3, will come in contact with the end of the spring *g*, and drive it forward, thus communicating to the balance an impulse which will always be of the same power. Immediately the end of the spring has escaped the tooth 3, of the escape-wheel, it will fly back to its original position, and rest against the verge-shaft, and on the return-motion of the balance, the end g^1, will again be in its place to receive the impulse from the next succeeding tooth 2, in the same manner as the notch in the before-mentioned pallet *g*. By the employment of this spring *g*, instead of the rigid pallet, a more powerful main-spring than ordinary may be used, which will have the effect of overcoming the stiffness or clogging property of the oil when affected by extreme cold, and yet, at the same time, allow of an undeviating impulse to the balance.

The patentee claims, First,—the novel construction of detent for locking the escapement-wheel of time-keepers; and also the mode of working the same, as exhibited at figs. 5, and 6. Secondly,—the construction and arrangement of locking apparatus, as shewn at figs. 8, and 9. And, Thirdly,—the application of a spring to the verge-shaft in place of the rigid pallet, as above described, with reference to fig. 13.—[*Iurolled in the Petty Bag Office, April,* 1846.]

Specification drawn by Messrs. Newton and Son.

To THOMAS HOLLINGSWORTH, *of Birmingham, in the county of Warwick, cigar merchant, for a certain improvement or certain improvements in the construction of cases for holding cigars.*—[Sealed 9th October, 1845.]

THE improvements in cigar cases, protected by this patent, are designed to prevent the cigars from shifting or moving in the case; this is proposed to be effected by introducing an elastic diaphragm, or other yielding surface, near the bottom or top of the case, or near the bottom and top; which diaphragm will press against the ends of the cigars.

In Plate XII., fig. 1, represents a longitudinal section of an improved cigar case; and fig. 2, is a plan view of the diaphragm and its framing. *a*, is a diaphragm of India-rubber or other suitable elastic substance, fixed near the bottom of the inner case *b*; and *c*, *c*, are the cigars, the lower ends of which rest on the diaphragm *a*. When the outer case *d*, is placed on the inner case *b*, the top of the outer case presses upon the upper ends of the cigars, and the elastic diaphragm at the same time presses against their lower ends; and by this means the cigars are held firmly.

The diaphragm is first stretched over an elliptical frame, and another elliptical frame is placed therein, and rivetted thereto; the elastic material is thus held in a distended state by the two frames, which are then fastened in the lower part of the inner case *b*. The elastic diaphragm may be placed with equal effect in the upper part of the outer case *d*. Or an elastic diaphragm may be placed at the lower end of the case *b*, and at the upper end of the case *d*; and then the lengths of the cigars may be more dissimilar than when only one diaphragm is used.

Other modes of carrying out this invention may be adopted: for example, any elastic or yielding padding or stuffing may be applied at the top or bottom of the case; or a moveable diaphragm, of any inelastic material, may be supported near the bottom or top of the case, on a spring.

The patentee claims the construction of cigar cases in which the cigars are held firmly, or prevented from moving, by pressure exerted against one or both ends of the said cigars; whether the pressure be produced by the methods above described, or by any other method; and whatever be the construction of the cigar cases in other respects.—[*Inrolled in the Inrolment Office, March,* 1846.]

To JOHN MARSHALL, *of Southampton-street, Strand, tea-dealer, for improvements in preparing cocoa and chocolate.*—[Sealed 16th October, 1845.]

THIS invention consists in manufacturing aromatic chocolate and cocoa by combining pulverized sassafras nuts therewith.

The chocolate or cocoa, prepared as usual, is reduced to powder, and the powder of sassafras nuts is then mixed with it. The sassafras nuts are prepared by roasting, in a similar manner to coffee, so that they may be ground in a chocolate or cocoa mill, or otherwise reduced to powder; but, before grinding, the nuts are well scraped, to remove the external surface. The patentee prefers to add one part of the pulverized sassafras nuts, and one part of raw sugar, to six parts of chocolate or cocoa; but these proportions may be varied.

After the powders have been thoroughly mixed, the whole is passed through a chocolate or such-like mill; and the mixture is then ready for use.

The aromatic chocolate or cocoa is prepared for consumption by boiling two table-spoonsful of it in a pint of milk and water; or the chocolate or cocoa is converted into a smooth paste by the addition of cold milk, and then boiling water is poured on it, and sugar added, if desired. The aromatic chocolate or cocoa should not be dissolved until required for use, as it injures the flavour.

The patentee claims the manufacture of an aromatic chocolate or cocoa by combining sassafras nuts therewith.—[*Inrolled in the Inrolment Office, April,* 1846.]

To William Betts, *of Smithfield-bars, in the county of Middlesex, distiller, for improvements in the manufacture of brandy, gin, and rum, and other British spirits and compounds.*—[Sealed 16th October, 1845.]

This invention consists in employing sugar in combination with repeated distillations of the spirit diluted with water. For each one thousand gallons of spirit, of fifty per cent. under proof, about twenty hundred-weight of refined sugar, dissolved in water, is employed for each re-distillation; and for distilling the spirit, diluted with water and mixed with sugar, any suitable still may be used. This process of re-distillation is repeated until no flavour of the grain is discoverable, or to such an extent as the distiller may be satisfied with. Or, in place of mixing the sugar, dissolved with water, together with diluted spirit in the still, the dissolved sugar may be put into vessels, and the spirit, in its passage to the worm tub or refrigerator, caused to pass into the sugar and water.

The spirit thus obtained is then treated and flavoured for making brandy, gin, and rum, and other British spirits and compounds, according to the judgment of the maker; but in making brandy, the patentee prefers that the same flavouring material used by the French makers should be employed.—[*Inrolled in the Inrolment Office, April,* 1846.]

To Henry Austin, *of Walbrook, in the city of London, civil engineer, and* Joseph Quick, *of Sumner-street, Southwark, in the county of Surrey, engineer, for improvements in the construction of railways and railway carriages and conveyances.*—[Sealed 11th March, 1846.]

This invention consists in improvements in railway carriages and conveyances, and in the laying and arrangement of the rails of the two gauges, termed the broad and narrow gauges, at the places where they meet, and at the crossings, sidings, and turn-tables of the two gauges, so that the same carriage or conveyance may travel both on the broad and narrow gauge, and pass from one to the other without stoppage.

The carriages and conveyances are of the narrow gauge dimensions, but, instead of only a single pair of wheels to each axle, two pairs of wheels, of the same diameter, are applied thereto; two being fixed at each end, and at such distances apart, that the outer wheels will fit the broad guage, and the inner ones the narrow guage. The axle bearings may be situated between the two wheels at each end of the axle, or outside the outer wheels; the grease or lubricating-box being regulated according to the bearings, and so placed as to be readily got at. The wheels for the two gauges may be fixed on distinct axles, instead of on the same axle; but the patentees prefer the latter arrangement.

At those places where the rails of the broad and narrow gauges meet, in order that the carriages and conveyances may proceed from one to the other, the rails of the two gauges pass each other (the narrow gauge-rails passing within the broad gauge-rails) for a short distance (say about three feet), so that the wheels appertaining to the gauge on to which the carriage is to be transferred may be travelling on the rails of such gauge before the other wheels quit the rails of the gauge to which they belong: the rails of each gauge are turned sufficiently outward to prevent the flanges of the wheels from striking against the rails.

At the crossings from one line of rail to another on the same gauge, and the entrances to the sidings on each gauge, openings must be made across each rail, at the proper distance from, and parallel to, the rails travelled upon in each direction, so as to allow the flanges of the wheels appertaining to the other gauge to pass through;—guide or check-rails being provided for each opening, as is now practised.

The only alteration required in the turn-tables is, that an additional square opening or notch (similar to those now made for the present number of wheels) be formed across each rail of the turn-table, to allow the flange of each additional wheel to pass through.

The patentees claim the use or application to the same railway carriage or conveyance of a double set of wheels, as before described, to fit the two gauges called the broad and narrow gauges, and the laying and arrangement of the rails at the meetings of the two gauges, and at the crossings, sidings, and turn-tables of each gauge, for the purpose of allowing railway carriages and conveyances, so fitted or constructed, to travel uninterruptedly over the lines of both gauges, as above described.—[*Inrolled in the Inrolment Office, April,* 1846.]

To David Wilkinson, *of Potters Pury, near Stoney Stratford, Gent., for improvements in obtaining motive power.* —[Sealed 10th October, 1845.]

This invention consists in a mode of heating atmospheric air, and combining the same with steam, and then employing them conjointly to work an engine, instead of steam or air alone.

The mode of applying this invention to work a high-pressure steam-engine is as follows:—The patentee employs an air-pump of about half the cubic contents of the cylinder of the engine, but he does not confine himself to that size; by means of this pump the air is forced through pipes or other suitable apparatus (to which heat is applied externally, in [illegible]er that the air may become highly heated) into a steam-[illegible]er or other apparatus, wherein the heated air combines [illegible]h the steam, and from thence the combined air and steam are conducted to the boiler of the engine. This invention is intended to be employed chiefly with high-pressure steam-engines; but it may be applied in the same manner to condensing engines.

The patentee says he is aware that it has been proposed to introduce heated air into a steam-boiler, and to use such heated air conjointly with the steam for working an engine; but in this case the air was heated, and more or less decomposed, by passing in contact with the fire employed for heating it, and the air and products of combustion passed together into the boiler. He does not, therefore, claim the use of heated air combined with steam, when the air has been brought into contact with the fire used for heating it, and then caused to pass, with the products of combustion, into the boiler; but what he claims is, the forcing of air through pipes or other suitably-heated surfaces, and then mixing the same with steam, and causing the steam and heated air conjointly to work an engine, as above described.—[*Inrolled in the Inrolment Office, April,* 1846.]

To AUGUSTUS JULIEN VAN OOST, *of Gaidbrugge, near Ghent, but now of Osnaburgh-street, Regent's Park, in the county of Middlesex, Gent., for improvements in treating seed, and in preparing materials used for fertilizing land, and for aiding vegetation.*—[Sealed 6th October, 1845.]

THE object of the first part of this invention is to apply to the corn or other seed a coating of "sulphuro-azoted principles," which, being absorbed by the young plant, or acting as a ferment, will aid vegetation in a considerable degree; and, for this purpose, the patentee employs a solution of gelatine, albumen, fibrine, or caseine, together with certain other matters.

A solution is prepared by dissolving 2¼ lbs. of gelatine in 6 gallons of water, and 2¼ lbs. of the meal of malt or wheat is mixed therewith; the corn or other seed, which has been first moistened with a solution of ammoniacal salt or carbonate of potash, at a density of 10°, is then introduced into the solution. When the seeds have become covered with the preparation of gelatine, they will adhere to each other, and to separate them a powder (described below) must be used, which, adhering to the gelatinous grains, will form a coating thereto; and thus materials to act as a ferment, and others to moderate this action, will be applied to each grain. The powder is prepared in the following manner:—50 lbs. of ashes (such as most closely resemble, chemically, the ashes produced by burning the plant, the seed of which is to be treated), 50 lbs. of carbonate of lime, or lime slaked in the air, 1 lb. of sulphate of iron, 25 lbs. of ground bones, and 25 lbs. of pigeons' dung, are well mixed; the patentee then dissolves 1 lb. of gelatine, ½ lb. of sulphate of potash, ½ lb. of carbonate of potash, ½ lb. of nitrate of potash, ½ lb. of ammoniacal salt, ½ lb. of phosphate of soda, and ½ lb. of sulphate of soda, in 6 gallons of water or putrid urine; the two mixtures being combined, a damp powder is produced, which is dried at 150° Fahr., and then used for coating the seeds.

Although only gelatine is mentioned in the above description, the other sulphuro-azoted matters may be used in place thereof, or combined therewith; the object being to add a further quantity of sulphuro-azoted principles to that already possessed by the grain or seed, as caseine in peas and beans, fibrine in corn, and albumen in seed.

The patentee does not confine himself to the exact proportions above mentioned, so long as gelatine, albumen, fibrine, or caseine, or matters containing them, are applied, so as to adhere to the grain or seed, together with matters suitable for modifying the fermentation. And he states that the juice of vegetables, blood, milk, cheese, the flesh of animals, and generally all organic liquids, which have a tendency to corrupt, ferment, or putrify, owe this property only to the sulphuro-azoted principles, albumen, fibrine, and caseine, which the oxygen of the air converts into ferment, as soon as it meets them in a suitable state.

The second part of this invention consists in the preparation of manure to be applied to land. 4 parts of ashes (similar to the ashes of the crop to be grown), 2 parts of pulverized rubbish of buildings, 2 parts of pulverized coal or coke, 2 parts of lime, slaked in the air, and 1 part of gelatine, are thoroughly mixed; then 1 lb. of sulphate of iron, 1 lb. of sulphate of potash, 1 lb. of nitrate of potash, 1 lb. of common salt, and ½ lb. of phosphate of soda, are dissolved in 6 gallons of water, and added to 100 lbs. of the aforesaid mixture; after which, the whole is dried at 150° Fahr., reduced to powder, and applied to the land. The proportion in which the manure is used varies according to the nature of the soil,—the average proportion is 250 lbs. per acre.

The peculiar character of this part of the invention consists in the use of sulphate of iron, of gelatine, and of the sulphuro-azoted matters above mentioned, and in their close mixture with the alkaline salts and inorganic matters, as above described, so as to favor a slow and regular decomposition.—[*Inrolled in the Inrolment Office, April,* 1846.]

To **Benjamin West**, *of St. James's Walk, Clerkenwell, in the county of Middlesex, book-binder, for certain improvements in covering or stoppering the tops of bottles, jars, pots, and other similar vessels.*—[Sealed 16th October, 1845.]

This invention consists in the application of the electrotype process for depositing metal around, upon, and over the upper surfaces of bottles, jars, pots, and other similar vessels, and the corks or other substances used therewith.

The following is the mode of carrying out this invention:— An electrotype apparatus, of a circular form, is constructed, and at or near the bottom of the vessel containing the sulphate of copper or other metal is placed a ring of copper or other metal, which is connected by a wire with the acid; upon the ring are placed, side by side, in an inverted position, the bottles, jars, pots, and other similar vessels, and in a short space of time their tops will become covered with a deposit of metal.

The patentee, in conclusion, says, "I claim, as my invention of certain improvements in covering or stoppering the tops of bottles, jars, pots, and other similar vessels, the application of the electrotype process for the purpose of effecting such covering or stoppering, in the manner herein described."—[*Inrolled in the Inrolment Office, April,* 1846.]

To GEORGE FERGUSSON WILSON, *of Belmont, Vauxhall, in the county of Surrey, Gent.;* GEORGE GWYNNE, *of Putney, in the said county of Surrey, Gent.; and* JAMES PILLANS WILSON, *of Belmont, aforesaid, Gent., for improvements in the manufacture of soap.*—[Sealed 10th October, 1845.]

THIS invention consists in manufacturing soap from fatty or oily matters, previously hardened with sulphuric acid.

10 tons of palm oil, whale oil, or other fatty or oily matter are put into a wrought-iron vessel, provided with a perforated steam-worm, through which steam is admitted until the matter is heated to 350° Fahr. The fatty matter is then run into a tank, formed of brick, lined with lead, and sunk in the ground; the tank is furnished with a pipe for the introduction of steam, but which does not terminate in a worm, as the sediment from the fat would be likely to choke a worm; the cover of the tank is made of wood, lined with sheet lead, and has two man-holes, closed by an oil-joint, about eight inches deep; through the cover a pipe passes, connected with a high shaft, to allow offensive vapours to escape; or the mixed vapours are allowed to escape into a large pipe, wherein they are condensed by a jet of water. 2000 lbs. of concentrated sulphuric acid of 1·8 sp. gr. are poured into the tank; the temperature of the mass being at the same time carefully watched by means of a thermometer, immersed in the mass, and not allowed to exceed 350° Fahr.;—the heat is regulated partly by slackening the speed at which the acid is poured in, and partly by lessening the heating of the steam admitted into the tank. The admission of steam is continued throughout the operation; but as soon as the whole of the acid has been added, the fire employed for heating the steam is extinguished, and after that the admission of steam is continued for about four hours;—the steam is heated, after it leaves the boiler, by passing through pipes

placed over a fire. At the expiration of four hours, the steam is shut off, and a large pump introduced through a pipe in the cover of the tank; then, as soon as the vapours given off will allow the pump to work, the product is pumped into a wooden vessel, lined with lead, and provided with a steam worm; in this vessel the fatty matter is washed, by means of free steam, with about half its bulk of water, for two hours, and is then allowed to rest for twelve hours.

The product thus obtained can be made into soap in the ordinary manner, either alone or combined with softer and cheaper materials; but the patentees prefer to distil the product before applying it to the manufacture of soap;—the distillation may be effected in the manner described in the specification of a patent obtained by George Gwynne and George Fergusson Wilson, November 16, 1843,* or in any other suitable manner. A cheap soap may be made by subjecting the distilled product to pressure, and employing the liquid that runs from the press for manufacturing soap, combined with about one-fourth of its weight of the substance known as vegetable wax; or it may be used for making soap in the same manner as tallow oil;—the hard product remaining in the press is applicable to the manufacture of candles.

A black sediment, heavier than water, is formed in the tank in which the sulphuric acid is combined with the fatty matter; this the patentees prefer to distil in a cast-iron still, into which steam is admitted, and to re-distil the product in the manner mentioned with reference to the distillation of of the bulk of the acidified fatty matter; and the re-distilled product may be used for making soap.

The proportion of acid above mentioned may be increased, but with a great loss of fatty matter; and the patentees also state, that half the above proportion will give a good product for soap making.

The patentees do not claim the manufacture of soap from fatty or oily matters previously treated with one-third or one-fourth of their weight of sulphuric acid (or in that proportion); or treated with sulphuric acid by being distilled in combination therewith. But they claim the application, in the manufacture of soap, of fatty and oily matters treated with less than one-fourth of their weight of sulphuric acid, as above described.—[*Inrolled in the Inrolment Office, April,* 1846.]

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* For description of this Invention, see p. 99 of the present Volume.

REPORT OF AMERICAN PATENTS.

From the "Journal of the Franklin Institute."

EDITED BY DR. THOMAS P. JONES.

To JACOB ZIEGLER, *of Philadelphia, Pennsylvania, for a machine for polishing flat plates or tables of marble.*

THE plates of marble, &c., to be polished, are placed, face upwards, on the top of a carriage, which carries them slowly under the rubber, which is a flat plate of wood or other material, covered with the polishing substance. This rubber receives a movement from two cranks or cog-wheels, attached to the lower ends of parallel vertical shafts, geared together, and driven by an intermediate cog-wheel on the driving-shaft. These shafts are hung in a sliding cross-head, suspended by levers, &c., to regulate the pressure of the rubber.

Claim:—"I do hereby declare that I do not claim, as new, either of the individual parts of said machine, but limit my claim to the combination of said individual parts, as above made known; said parts consisting of the reciprocating polisher, combined with the crank-wheels, with the driving-wheel, and with the sliding head and regulating rods and levers, so as, by said combination, to constitute a machine substantially the same with that herein described and represented."

To JAMES BLACK, *of Williamsport, Lycoming county, Pennsylvania, for an improvement in the rotary steam-engine.*

THE patentee says,—"My rotary steam-engine is of that kind which is usually denominated a re-action engine, as it is made to discharge the steam which is admitted into it from the ends of two or more arms, the discharge orifices at the outer ends of which are in the direction of a tangent to the circle in which they rotate, being in this respect similar to the well-known Avery's rotary engine, and others operating on the same general principle: I have, however, ascertained experimentally, that the power of such an engine may be considerably increased by admitting water into the steam-arms, just behind the point at which the discharge of steam takes place; such water entering said arms in the direction of the radii of the circle of rotation, and consequently at right angles, or nearly at right angles to the current of effluent steam. To effect this, I place the axis of my rotary engine vertically, and extend the arms for the passage of steam horizontally, curving them at their outer ends, so that their steam issues shall stand in the direction above indicated. Steam is to be admitted into the revolving axis at its lower end, and is to flow thence through the steam-arms. The steam-arms are to revolve within a circular case, or drum, standing horizontally, and there is a depression towards the centre part of this drum, which is to constitute a reservoir of water, or other fluid, from which the current is to be supplied that is to pass into each of the steam-arms, and into which it is to return after it has performed its office. To carry this water or other fluid to its destined point, I use a second series of tubes, the outer ends of which enter the steam-arms, as above stated, whilst their inner ends are bent down so as to dip into the above-named reservoir; the result of this arrangement is, that each of the water-tubes operates, when the steam-arms are set in motion, as a centrifugal pump, raising a portion of water from the reservoir, and delivering it into its appropriate steam-arm."

Claim:—"What I claim therein as new, and desire to secure by letters-patent, is the combining with each of the steam-arms a tube, one end of which shall dip into a reservoir, which is to contain a portion of water or other fluid, which fluid, in its heated state, is to be carried into the steam tube by the centrifugal action of the engine, and is to enter said steam tube near the orifice for the emission of steam, and at right angles, or nearly so, to the course of the effluent steam; said water, or other fluid, being allowed to flow back into the reservoir, so that it may be continuously used for the purpose and in the manner herein set forth.

"I do not claim the introduction of a jet of cold water into the revolving arms for the purpose of condensing the steam, as was proposed in a rotary engine known as Sadler's; the water or other fluid used by me being, as hereinbefore stated, employed in its heated state, and for a purpose altogether different from that of condensation."

To JOHN MORRISON, *of Newark, Essex county, New Jersey, for an improvement in stoves for warming parlours, and for other purposes.*

THE nature of this improvement consists in taking the air from near the ceiling of rooms, for supplying air to the fire, and thus incidentally ventilating the apartment. For this purpose there is a pipe which extends up from the ash-pan to within a short distance of the ceiling, where it is made bell-mouthed for the free admission of air. This pipe is surrounded by an outer jacket which communicates with the chimney, the fire-chamber, and with the case surrounding the fire-chamber of the stove, by separate pipes, governed by dampers for regulating the draught, heat, &c.

Claim:—"What I claim therein as new, and desire to secure by letters patent, is the combination of a pipe or tube, constructed and arranged substantially in the manner set forth, with a stove or fire-chamber, as above described, for ventilating the room and supplying air at a high temperature.

"I also claim, in combination with the above, the radiator or column, the outer case surrounding the stove, and the eduction or hot-air pipes, constructed and arranged in the manner and for the purposes herein specified."

To JOHN ELGAR, *of Brookville, Montgomery county, Maryland, for improvements in railroads.*

CLAIM:—"What I desire to secure by letters patent, is the use of the continuous strip of wood, or other elastic substance, combined with the under rails, as described herein, and with the wrought or cast-iron top rails of the plate or bridge, or any other form, substantially in the manner set forth.

"I also claim the manner of connecting and holding together the upper and under rails of iron, as herein described, so as to make the under rail serve as a chair, throughout its whole length, to the top rail, the latter being embedded in a channel in the former; or, as in the other described plan, where the top rail is grooved on the under side, and rests on the under rail as a saddle, thereby giving strength and stability to the joints of both the upper and under rails.

"I claim the use of cast-iron top rails, when in connection with iron under rails.

"The under rail is made in manner similar to the T rail, except that the top is grooved out to receive a flat rail and a continuous strip of wood between them."

To JAMES D. WILLOUGHBY, *of Gettysburg, Adams county, Pennsylvania, for improvements in the machine for turning.*

THIS machine is for turning hubs, and other similar articles, by means of rotating cutters, which act on the wood affixed to a slowly turning mandril, to rough-shape it, the smoothing being effected by a permanent smoothing-iron, of the form of the article intended to be turned. The manner of arranging the rotating cutters is fully expressed in the claim. The carriage which carries the mandril, &c., is made to advance slowly towards the rotating cutters by means of a screw and vice, or jaw-nut, embracing it, and made in two parts, to throw it in and out of gear; and for the purpose of adjustment, this nut or vice is regulated by a separate screw.

Claim:—"What I claim as my invention, and desire to secure by letters patent, is constructing the cylinder of cutters with parallel bars and spirally arranged cutters, made adjustable with screws and nuts, in the manner and for the purpose described.

"I also claim the arrangement of the smoother in combination with the rotating cutters.

"I likewise claim the manner of adjusting the vice or nut for throwing the carriage in and out of gear with the screw, by means of the slide and screw."

To ELIPHALET S. SCRIPTURE, *of New York, for an improved oil-can, for oiling the rubbing parts of machinery.*

THIS can is in the form of a funnel, with the spout so small as just to permit the oil to drip out, and the bell-mouth is closed up air-tight, by a disk of flexible metal, which is kept out by the tension of a helical spring within, so that when this disc is forced out as far as the flexibility of the metal will permit, the capacity of the can has its fullest extent, and being filled with oil, a slight pressure on the disc, tending to force it in, will reduce the capacity of the chamber and force the oil out of the small aperture in the spout, the discharge being immediately arrested by removing the pressure from the disc. It should be provided with a spout and stopper for introducing the oil.

Claim:—"What I claim in the above-described instrument, and desire to secure by letters patent, is the combination of the spring with the oil-can, or syringe, substantially in the manner and for the purpose above described."

To JOHN HAW, *of Hanover, Virginia, for an improvement in the horse power for driving machinery.*

THE horses are applied within the rim of the wheel, and for the purpose of getting them in and out, the spindle on which the wheel turns is hinged at the bottom to the platform or frame, so that the whole wheel can be canted. Motion is communicated from the wheel to the machinery to be driven by the rim of the wheel, which is a flat plate of metal that runs between two small wheels, one above and the other below, and so arranged as to gripe the rim,—the shafts of these two wheels being geared together.

Claim:—"What I claim as my invention, and desire to secure by letters patent, is hanging the spindle on which the horse wheel turns to journals or trunnions, to admit of canting the wheel for admitting horses, &c., within the rim, as herein described, or in any other manner substantially similar. I also claim applying the circular metallic rim as a propelling power, in combination with two rollers placed on axles, which are connected by two cogged wheels geared into each other, thus combining the adhesion which is acquired on both sides of the rim, as described.

To THOMAS G. WARREN, *of Troy, Rensselaer county, New York, for an improved mode of making hydraulic paint.*

THE patentee says,—"This paint is composed of 'hydraulic cement,' (sometimes called 'water lime') made fine by grinding, and 'linseed oil,' to be mixed in such proportions as to make a paint of ordinary thickness.

"The use to which this paint can be applied is general. It can be applied to houses of either brick or wood, and also to cloth roof to houses, or other purposes. I have a cloth roof to my house painted with this new paint, and it is perfectly tight. The cost of such a roof is considerably less than that of ordinary roofs.

"The same materials, but with a less proportion of the oil, make an excellent water-tight putty."

Claim:—"What I claim as my invention, and desire to secure by letters patent, is the method of making said paint by the composition of the substances mentioned, in the manner above described; the same to be made of different degrees of thickness, so as to be used either as a paint or as a putty."

To RUFUS AND HENRY BRACKETT, *of Boston, Massachusetts, for improvements in machinery for dicing and polishing morocco leather.*

THE nature of this improvement consists in arranging upon one wheel a series of smoothing or polishing balls, and another of dicing tools, each of the said polishing balls being followed and preceded by a dicing tool. The dicing and polishing tools are connected with the wheel by sliding rods, surrounded by helical springs to force them out, and regulating nuts to adjust the distance to which they are to be forced out. And for the purpose of sharpening the dicing tools, a cutter is properly affixed, by a set screw, &c., to the edge of the curved table which receives the leather.

Claim:—"We do not claim a wheel having a series of dicing tools alone applied to it, as heretofore made, or one having a series of polishing tools alone; but that which we do claim, is the arranging of a series of dicers and one of polishers upon one wheel, so as to be operated with respect to each other, substantially as described. And furthermore, we do not claim the use of a tool for cutting or repairing the dicing tools, but that which we do claim is, the arranging or applying such a tool upon the top of the curved table, in such manner as to admit of its being readily forced forward against the dicers, at any time whenever necessary, for the purpose of cutting them, as hereinbefore described."

To JOSEPH SAXTON, *of Washington, District of Columbia, for improvements in presses.*

THE patentee says,—"My invention and improvements consist, first, in the use of a flexible or elastic platen, instead of a rigid or inflexible plate of metal as a platen. Secondly, in the application of pressure to such flexible or elastic platen by means of a liquid, or aeriferous fluid; and thirdly, in the arrangement of machinery in printing presses, copying presses, and lithographic and zincographic presses, for the purpose of applying such pressure to such flexible or elastic platen.

"The object and effect of using a flexible or elastic platen with the pressure by means of a liquid or aeriferous fluid is, that the platen is equally pressed or acted upon over its whole surface, and which may therefore be employed in any position, to press upwards, downwards, or sideways.

"The said flexible or elastic platen is to be of the necessary size for the press in which it is to be used, as in the case of the ordinary platen, and is to be a thin plate of brass or other suitable metal, varying in thickness from that of a sheet of foolscap paper to about half an inch, according to the dimensions of the platen, and of the vacant spaces between the columns or pages of types or figures, technically in printing called 'the white.'

Claim:—"I do not mean or intend hereby to claim as my improvements or invention any of the parts of the machine or machines, presses, or letter-copying machine, herein delineated or described, nor do I intend or mean to limit myself to the employment of any particular material or materials in the construction thereof, but to use any which are fit and proper for the purpose intended. But I do hereby claim the use and application of a flexible or elastic platen, in the manner herein described, the application of pressure thereto in printing presses, copying presses, lithographic presses, and zincographic presses, by means of a liquid or aeriferous fluid, in the manner also herein described, and the arrangement of the machinery or parts of the said presses, as herein described, for the purpose of applying such pressure of a liquid or aeriferous fluid to such flexible or elastic platen."

To FOWLER M. RAY, *of New York, for an improvement in railroad trucks.*

THE patentee says,—"The nature of my invention consists in substituting a single cross beam of timber, having end bearers of metal for the connecting bars of the axles, furnished with a single spring, and having a pedestal connecting the bearer, spring and cross beam, together at each side of the truck, in such manner as to give to the whole framework or superstructure of the truck a yielding capacity, instead of the usual method of a stiff framework, and short unyielding springs, two at each side, as heretofore most commonly constructed. By which yielding quality, I effect several desirable objects.

1st. The capability of elevating either of the wheels of the truck to a considerable height without affecting the position of the remaining wheels upon the track, and by which obstructions are passed with greater safety. 2nd. I give to each axle, independent of the other, a facility to vibrate laterally without changing their parallel position to each other, and by which, short curves are made easy. 3rd. Its yielding and elastic quality, rendering vertical and lateral concussions less severe than in the ordinary (rigid frame) truck."

Claim:—"What I claim as new, and desire to secure by letters patent is, First,—the above-described cross-beam, combined with the pedestals, the springs, the connecting bars, and the howsings, substantially as described; by which a yielding capacity is given to the superstructure or frame part of the truck, allowing a wheel to rise over an obstacle upon the track without affecting the condition of the remaining wheels. Secondly,—the formation of the journal boxes, by which the axles of the truck may vibrate laterally, the one independent of the other, to accommodate their position upon the track, (and so making curves easy) which, combined with the other yielding qualities of the truck, acting together, produce a semi-universal joint effect."

To William H. Shecut *and* Horace H. Day, *of New York, for an improved mode of preparing adhesive and strengthening plasters of India-rubber.*

The articles we employ in the preparation of the said plasters, are those known in commerce as caoutchouc, or India-rubber, pine gum, (obtained from the southern yellow pine, commonly termed 'long leafed' pine,) cayenne pepper, balsam of Peru, litharge, and spirits of turpentine.

The proportions are five pounds India-rubber, reduced to fine shreds, steeped in soft water for softening it, then put, with sufficient quantity of spirits of turpentine to cover the India-rubber, in a vessel, the quantity to be increased as the gum soaks it up. When the rubber is sufficiently dissolved, it is pressed through a fine sieve. Four ounces of capsicum amnum, or cayenne pepper, is heated in a quart of spirits of turpentine. A portion of this tincture is ground with a pound of litharge and then mixed with the remnant of the tincture, and to it is added six ounces of the balsam of Peru. Then melt a pound of pine gum, and add spirits of turpentine until it is thin enough to strain; and finally, all the preceding preparations are mixed together.

Claim:—"What we claim as our invention, and desire to secure by letters patent, is the combination of the materials in the general proportions above described, for making an adhesive plaster.

"We also claim making plasters porous, or pervious to fluids, by perforating them with numerous minute holes."

Scientific Notices.

NEW ELECTRO-MAGNETIC ENGINE;

BY CHAS. G. PAGE, M.D.,

Professor of Chemistry and Pharmacy, Columbian College, Washington, D.C.

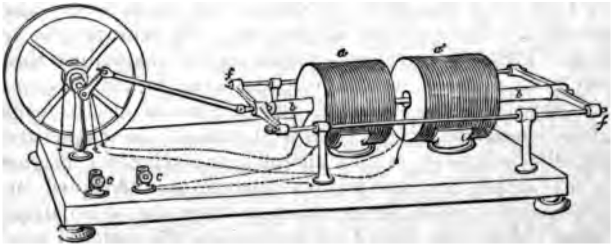
[For the following interesting Paper we are indebted to Professor Silliman's American Journal of Science.]

This new species of electromotion, which, by way of distinction, I denominate the axial reciprocating engine, was unsuccessfully attempted in the year 1838. My failure at that time was owing to a want of suitable batteries, but being furnished in the winter of 1843-4, with some of the excellent batteries of Prof. Grove, I recommenced the experiment, and exhibited one of these interesting engines to the members of the Geological Association held in this place in May, 1844. To sustain a small needle within the helix is a trite experiment, but by the arrangements I have adopted, a bar of soft iron or of steel (which becomes instantly and powerfully magnetized) is sustained entirely free from any visible support, and this too by the action of only six small Grove's batteries. This is almost a realization of the fable of Mahomet's coffin, or the statue of Theamides. When the helix is connected with six pairs Grove's, in good action, it will draw up within its centre a bar of iron or steel weighing two or three pounds, and sustain it with its upper end projecting above the helix. When the bar is very light, for instance a tube of sheet iron, and somewhat longer than the helix, its upper end will project nearly as much above, as its lower end is below the helix. A variety of very pleasing experiments may be made with things thus arranged. If the battery circuit be broken rapidly, the bar will not drop, but exhibit a rapid vibratory or dancing movement. If the battery current be slightly diminished without actual interruption, and there are various well known ways of doing this, the bar will sink, and rise again on restoring the full power of the circuit. The sensation is novel and peculiar when the bar is pulled down slowly through the helix, owing to the great space

—at least three inches—through which the action is sensibly maintained. If a string be attached to the bar and the circuit broken by drawing the wire across a rasp or file, to a person holding the string the sensation is precisely that felt by the angler when the fish has seized his hook. As pleasing modifications of this experiment, I have contrived several instruments, one of which is called the watchman in his tower. The helix is mounted upon a stand, and the connexions with its extremities so arranged, that when the connecting wires with the battery are made to touch the legs of the stand, the armature or bar which is concealed within the helix, instantly starts up and exhibits the figure of a man upon its upper end, which falls back upon breaking the circuit.

Another curious instrument is the galvanic or magnetic gun. Four or more helices arranged successively, constitute the barrel of the gun, which is mounted with a stock and breech. The bar slides freely through the helices, and by means of a wire attached to the end towards the breech of the gun, it makes and breaks the connection with the several helices in succession, and acquires such velocity from the action of the four helices, as to be projected to the distance of forty or fifty feet. Among the useful results of this principle of action, are a galvanometer of great value to the experimenter, and the electro-magnetic engine. The galvanometer gives an actual measurement by weight of any combination of pairs, up to that number which is beyond the saturating power of the bar or magnet within the helix, that is to say, for an instrument with a given sized helix; for the size of the helix and bar may be increased so as to measure the power of any number of combinations. The bar in this case has its lower end just within the upper part of the helix, and its upper end attached to the hook of the spring balances commonly used in shops and elsewhere, for weighing light goods, &c. The great power of the helix in this case is due to the proportions of its length and diameter, and the length of the wire to the quantity and intensity of the current. The helix is about four inches long, three inches in diameter, central opening three fourths of an inch in diameter, and of one continuous copper wire.

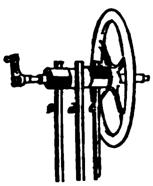
Fig. 1.



AXIAL RECIPROCATING ENGINE.

The construction of the engine will be readily understood from inspection of fig. 1. *a*, a^1, are two helices of the above description, firmly secured to the base-board, and set with their axes exactly in a straight line. The two bars *b*, b^1, connected together by a stout brass rod, are attached to a sliding frame *f*, *f*, and made to play with as little friction as possible. The wires from the extremities of the helices pass down through the base-board, and the proper connexions are made with the cut-off upon the shaft of the fly-wheel, as shewn in the detached view figure 2. The dotted lines indicate the course of the wires and their connexions with the cups, *c*, *c*, and the conducting springs *e*, *e*, fig. 2. The operation of the cut-off or electrotome, will be readily understood by any one familiar with the rotary machines without change of poles. The bar *b*, as represented in the figure, has nearly reached its position of equilibrium with the helix *a*, and by its motion through the helix, has carried the bar b_1, which is attached to the same frame, into a position to be acted upon by the helix a^1. When *b*, is at its position of equilibrium, the crank of the fly-wheel is at one of its dead points, the cut-off on the shaft intercepts the galvanic current from *a*, and conducts it into a^1, which then draws in the bar b^1, and thus a reciprocating engine is produced, which in case of the model above described, has three inches stroke.

Fig. 2.



It is obvious that the helices may be made to move instead of the bars, but the choice would be given to the movable bars, as they are in this case lighter than the helices. The bars may be hollow or solid—solid bars answering best—and of soft iron or steel, but soft iron is preferred. When the bars are of steel, immediately after using the machine with the battery, the bars are highly charged with magnetism, and if the battery be disengaged and the machine worked mechanically, it becomes a magneto-electric machine, furnishing bright sparks upon the cut-off, and strong shocks. In this experiment the two cups *c*, *c*, are connected by a short wire. In operating this machine by the battery, it exhibits one of the most beautiful, simple, and at the same time most powerful movements ever produced by electro-magnetism. The peculiar advantages of the arrangement are as follows: First,—a continuous action may be maintained through a very great distance, as will be by-and-by explained. Second,—the retardation common to all other forms of electro-magnetic engines, cannot occur here; for as the bars to be magnetized are small, they are very rapidly charged, and whatever magnetism they may retain after the galvanic current is intercepted in the helices, cannot retard their motion, as there can be no attraction between the copper wire of the helices and the inclosed iron bar.

Hence with a given quantity of battery surface the maximum of speed and power is obtained. The retardation from the permanent retention of magnetism, the time occupied in charging a magnet to saturation, and the time required to discharge the magnet, are serious obstacles in the way of obtaining any available power in ordinary electro-magnetic machines, and occasion that singular anomaly,—that the actual power of such machines diminishes as their rate of revolution increases. Add to these difficulties, the influence of secondary currents, which, as I have shewn several years since, always remagnetizes a bar of iron after the battery current is cut off, and the third advantage of the new engine will be appreciated,—for in the first place, the secondary current occurs in all other forms of electro-magnetic machines, when the armatures or magnets are very near the point of greatest action, but in this engine the secondary current occurs at the farthest possible distance from this point; and in the second place, the secondary current has no perceptible influence upon the inclosed bar when it does occur. The mechanical power derived from this arrangement, should it ever be found economical, will be increased, by increasing the number of small machines. Any length of stroke may be obtained by arranging the helices in a straight line and causing the bar or bars to pass through the whole length, multiplying the number of helices, in proportion to the length of stroke.

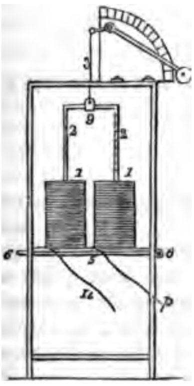
It has long been a mooted question among mechanics, whether a rotary steam engine would have any real advantages over the reciprocating engine, and as no genius has arisen to give us a rotary engine which might claim comparison, it is still a question. But in regard to *this kind of electro-magnetic engine*, the rotary form is most desirable, for certain reasons to be hereafter explained. This interesting modification of the experiment was matured some few days after the reciprocating engine was completed, and will be shortly explained. In addition to the power of the helix in drawing the bar within itself, I have availed myself of an extra source of attraction, viz., the actual power of the magnet, which receives an additional impulse by the attraction between it and an armature or bar of soft iron. This impulse, which is powerful, is received at an unfavorable moment, as it is nearly at the end of the stroke, when the crank is only a short distance from the dead point; but I have made use of it nevertheless to advantage, by an arrangement which I will describe hereafter. In the rotary form there is no mechanical difficulty of this nature to overcome.

AXIAL GALVANOMETER, AND DOUBLE AXIAL RECIPROCATING ENGINE.—BY CHARLES G. PAGE.

As this instrument possesses characteristics distinguishing it from all others, I have selected for it the term *axial*, as appropriate and in some measure descriptive of its character. In all the known forms of galvanometer, the magnetic needle or a bar of magnetized steel is used, to indicate the action of the galvanic current, or else the coil of wire itself is free to move, while the needle or bar is stationary. In all such instruments there is one liability to error from a source not sufficiently regarded, viz., the frequent disturbance of the power of the needle by the magnetizing power of the current in the coil, which, if the needle is in such position as would naturally result from the action of the coil, will slowly increase its magnetic power, and if forced by accident or otherwise into a reverse position, will diminish its power, and ultimately reverse its polarity, provided the current be powerful and the action continued for any length of time. In the new instrument, no permanent magnet is used, the motion necessary for purposes of indication being made by the action of the coils upon a bar of soft iron. Every bar of soft iron retains, after being powerfully magnetized, a certain amount of magnetic power; but this, if the bar is not very large and hard, is very small, and may be considered as nearly a constant quantity. I have sometimes thought that the term absolute galvanometer might well be applied to this instrument, as it immediately indicates by weight the absolute force exerted upon the iron bar. I would not recommend the mounting of the instrument in the style exhibited in the figure, as the sketch is taken from the instrument in its primitive form. Many modifications will suggest themselves of modes of constructing the instrument, as well as the means of indicating the forces.

The U-form bar 2, 2, Fig. 1, is of soft iron carefully annealed, well polished, and graduated to spaces of one-sixth of an inch upon one of its legs; the diameter of the iron is about one-eighth of an inch less than the opening in the centre of the helix, to allow free play as the helices are raised and lowered, or the magnets drawn down within them. The bar is suspended by a small brass wire 3, passing through the top board of the frame-work, and attached to the short arm of a bent lever balance. The helices are supported upon the shelf 5, which is raised and lowered, and sustained by means of the pins 6. The wires from

Fig. 1.



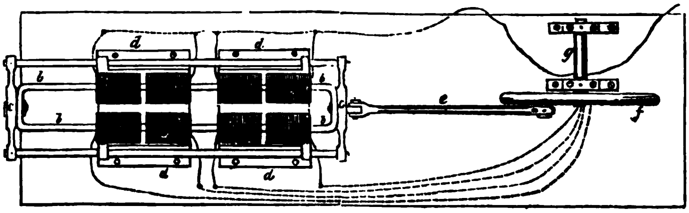
the helices *p, n,* are to be connected in any suitable manner with the poles of a battery. Guide-rods or pins may be inserted in the poles of the magnet, which pins or rods may pass through holes in the centre of a plate of metal let into the lower board of the stand, or one a little more raised, so as to allow for the motion of the entire length of the bar; but this last device is hardly necessary, for if the bar should incur friction by touching the helices, it is easily freed from it by slightly shaking the apparatus. I have sometimes used the spring balance instead of the bent lever, and although the former is not so sensitive as the latter, yet it possesses some advantages. In the bent lever balance, the point of suspension of the wire 3, must describe an arc of a circle, while in the spring balance the point of suspension moves in a straight line, making less liability to friction.

Operation.—When an intensity battery, say two or any number of Grove's battery, is connected with the helices by means of the extremities *p, n,* the bar 2, 2, is drawn down with a degree of force which will be indicated by the scale of the balance. The force indicated will vary with the degree of insertion of the bar. When its legs are just within the helices, the action is slight; as they descend further, the action increases, until they reach a point about two-thirds the way down the helices, when the action is at its maximum. By raising and lowering the shelf 5, the action may be varied accordingly, and when the bar is so far inserted as to give the maximum of effect, it should be left thus far inserted when the greatest degree of sensitiveness is required. It will be found that from the first insertion of the legs of the bar within the helices, to their entire insertion up to the bend 9, the force is continually exerted to draw down the bar; and in the experiments performed with a bar 10 inches long, the force exerted by five pairs of Grove's battery was equal to two pounds. As the point of greatest attraction is neither in the centre, nor at the extremities of the helix, but somewhere between them, I find that the position of this point varies with the length of the bars employed, and has different relations in differently proportioned helices. This instrument is not offered as a sensitive galvanoscope, but is calculated to measure the force of currents when large batteries are used, or any number of small batteries joined as a compound battery. It affords at once a valuable instrument for determining the properties of helices of various sizes and lengths, of magnets, and of all those relations and proportions between battery surface, size of iron for magnets, and number of convolutions and size of wire, which must be determined before the economy of magnetic power can be settled. It would require a vast expenditure of time and material to settle the above points, for it is obvious that the magnetism of the bar does not depend upon the quantity of electricity which the battery is capable of generating, but upon the quantity circulating in the wire around the magnet, as well also as upon other conditions. For instance, if the wire employed in these experiments be wound after the method of Prof. Henry in separate strands, the five pairs Grove's will manifest but very little action upon the magnet or enclosed bar. And if the same wire is one continuous piece, as it is actually used, and the same surface exposed in five pairs be converted into one pair, the action will then also be very slight. This is one of the most important principles to be regarded in all of the applications of galvanism for the development of magnetism. The proportions of battery, and length and size of wire, and relations of length to diameter of the helices used in the instrument just described, seemed to be very near correct, and I am indebted for them to Mr. Vail, Prof. Morse's assistant. I had never seen so great a weight sustained within the helix as in one of about the size used above, and first kindly shewn and lent to me by Mr. Vail. The bar he sustained within a single helix by means of 10 pairs Grove's battery, weighed over half a pound. By modifying the proportions, I have succeeded in sustaining over three pounds, and believe that even ten times that amount may be sustained free of visible support, by proper attention to the several ratios required.

DOUBLE AXIAL RECIPROCATING ENGINE.

The use and action of the galvanometer will readily explain the basis of the double engine. The power of the helices is much better displayed when the U-form bar is used instead of a straight bar of iron, as in the first engine. As the straight bar reaches its equilibrium with the helix, when its projecting portions are of equal length, or rather when the centre of the helix exactly coincides with the centre of the bar, it was plainly inferible, that the U-form bar would be drawn through the helices until they were both intercepted by the bend of the bar. This was fully verified by experiment, as follows. A bar of iron of this form, having its legs ten inches in length, was mounted upon a sliding frame—part of its weight counterpoised, and its legs inserted into two helices of three inches length ; the helices were then connected with the battery, and the bar was drawn through the helices until they rested upon its bend. Thus with a single pair of helices and a single bar of iron, a continuous impulse was given through the space of ten inches, affording at once the elements for the most simple and efficient exhibition of magnetic power as a propelling agent. The power, as measured by the axial galvanometer, averaged in this experiment 1¾ pounds through the ten inches; in the last half inch or that near the bend, the power was two ounces, and at the point of greatest action it was 3½ pounds. I find, moreover, that the helices, if properly suspended, will pass over the entire length of two feet; though, from the difficulty of magnetic induction through such long bars, the power is feeble through a considerable portion of the space. The machine represented by fig. 2, has six inches stroke, and although its mechanical power has not been absolutely tested, yet, for the elements employed, it is by far the most powerful engine of the kind I have seen; and its operation is so encouraging that I am preparing for another engine, of one foot stroke. Upon inspecting the figure, the whole arrangement, which is very simple, will be understood at a glance. The U-form bar *b*, *b*, is joined to one of a similar size and shape, placed at the other end of the sliding frame, *c*, *c*. They are joined by means of brass rods about six inches in length, and of the same thickness as the bars of iron, and both are firmly secured by the cross heads and sliding rods of the frame *c*, *c*. The helices *a*, *a*, are firmly cemented in a stout casting *d*, *d*, which also contains the bearings of the sliding rods. The frame is attached to the fly-wheel *f*, by the connecting-rod *e*, and crank-shaft *g*, after the usual manner. The dotted lines represent the course of the wires from the helices underneath the base-board, which again pass up through it, near the crank-shaft, to be connected with an electrotome or cut-off. This part of the engine will be understood without further explanation by all familiar with the subject. It will be noticed, however, that instead of using a single pair of helices upon the U-form bar, there are two pairs. This arrangement makes a great gain of power, for the action upon the bars is made consecutively by the helices while the bars are passing the strongest points of each. In the machine of one foot stoke, there will be four pairs upon each bar, operating consecutively. It is obvious that they may be increased in number as the length of stroke increases, even up to two feet.

Fig. 2.



Scientific Notices translated from Foreign Works, for the London Journal of Arts.

ON THE EMPLOYMENT OF ESSENCE OF TURPENTINE AS A SOLVENT FOR CAOUTCHOUC.

BY M. BOUCHARDAT.

(From the Bulletin du Musée de l'Industrie.)

About ten years since I was consulted by a manufacturer of waterproof fabrics, as to the best solvent for caoutchouc. At that time either essential oil obtained by distilling coal tar, or oil obtained by the open distillation of caoutchouc, was used in England.

I commenced by carefully studying the nature of this pyrogenous oil, and separated from it several kinds of carburetted hydrogen, remarkable by their point of ebullition being very low; I was not long, however, in being convinced, that if pyrogenous oil of caoutchouc is a good solvent of that substance, its cost will prevent its being for some length of time employed. The essential oil, obtained by distillation from tar, has a disagreeable smell, from which it is so difficult to free the fabrics, that I determined to find, if possible, another solvent.

From the first I thought of a natural carburetted hydrogen (essence of turpentine), which it is well known acts as a solvent of caoutchouc; I hoped that by modifying it by heat its solvent properties might be augmented,—I was confirmed in this idea by experience. By distilling this essence openly, once or twice, a solvent is obtained which gives satisfactory results. I also remarked, that by effecting this distillation upon fire-brick, the essence being submitted to a higher temperature, a liquid was obtained which was very little inferior, as a solvent, to the pyrogenous oil of caoutchouc.

The manufacturer who had consulted me hastened to profit by the results which I had obtained, and having reserved the right of publishing them, I made them known in my treatise upon the products of distillation of caoutchouc, inserted in vol. 23, of the Journal de Pharmacie. Since that time, the essence of turpentine, modified by one or two open distillations, has been the solvent for caoutchouc employed by manufacturers of waterproof fabrics in both France and England.

The following are the physical properties possessed by essence of turpentine, obtained by open distillation upon fire-brick. Its color is yellowish; its smell partakes of that of thyme, oil of naphtha, and essence of turpentine; it is lighter than the essence from which it was made in the proportion of 0.8726 to 0.8420. Its boiling point is 85° centigrades; but the temperature rises immediately afterwards to 154°, and remains stationary at that point. I have enquired whether it was not possible to isolate the former more volatile portions; but, notwithstanding great care and the best refrigerating mixtures, I have only been able to separate a very small portion, insufficient for useful examinations. In general the improved essence has been found to boil at 154° centigrades, whilst before its distillation its boiling point varied from 156° to 158° centigrades. I analyzed the modified oil, and found that its composition was exactly the same as that of the primitive essence.

ON THE CRYSTALLINE FRACTURE OF WROUGHT-IRON, AND THE CAUSES OF THE SAME.

BY M. AUG. MALBERG.

[*From the Bulletin du Musée de l'Industrie.*]

The accidents originating in the breaking of locomotive engine and railway carriage axles have given rise to enquiries and experiments, as to the quality of the iron of which such axles had been made.

The surfaces of the fractures which were examined presented large crystals, and as the axles had mostly been in use a considerable time, the conclusion arrived at was, that the crystalline texture resulted from the action to which the axles had been submitted whilst in use. The commission appointed by the French Government to institute enquiries on the occasion of the accident on the Versailles railroad, declared, that if the axles had been manufactured from iron possessing a strong tenacious fibre, the daily rotation and contact with the rails would give rise to electric or galvanic action, of such a nature as to produce changes in the body of the iron, so injurious, as regards its tenacity and ductility, as to render it quite unfit for use.

Mr. Charles Hood subsequently published an article, in which he maintained that the principal causes which produce a crystalline texture in wrought-iron, originally of a tenacious and fibrous nature, are shocks, elevation of temperature, and magnetism; and he adds that it is doubtful whether one of these forces alone would be sufficient to produce that effect, but there is every reason to believe that by the combination of all three these phenomena are produced.

The original texture of bar-iron is granular and angular. It is by being submitted to the action of the hammer or rollers that it acquires a fibrous texture, as by those means the crystals are drawn out and elongated. This is more especially the case when the rolling process is employed; for when the hammer is used, it is not unusual, especially in large pieces of iron, to find the interior granular, whilst at and near the surface, it has become more or less fibrous. This difference or inequality in the texture arises from the fact that the blows of the hammer, whatever may be its weight, do not penetrate to the interior of the iron. The property possessed by the iron, of passing from a granular to a more or less fibrous state, depends upon the primitive quality of the iron; some castings possess it to a less extent than others. Consequently, in order to judge of the texture of iron from a recent fracture, it is indispensably necessary to pay attention to the manner in which the fracture has been occasioned.

A fracture caused by loading a piece of iron in a longitudinal direction, or in the direction in which it has been rolled or hammered, will generally, in iron of good quality, be angular; the fibres are drawn out in fine points, and more so in rolled than hammered iron; it also presents a different aspect under incidental and reflected rays of light, being either of an ash grey or dead silver color, or a mixture of both. In order to judge of the quality of the iron from this, the bar must be turned in every direction, and the light thrown upon all sides of the fracture and in the middle. When, under these circumstances, the fracture appears of a greyish color, with short fibres and very slightly angular, the conclusion may be safely arrived at, that it is iron of an inferior quality. It is, however, advisable to take into consideration whether the fracture was occasioned by a sudden shock, or by gradual augmentation of the charge. In the former case, the iron appears of a light grey color, more crystalline, with short fibres, and its fibres do not terminate in fine points; whilst, in the latter case, it is thready, and of a dead silver color under certain incidence of light.

When, on the contrary, the iron is broken in a direction at right angles with that in which it was rolled (but in such manner as to take its absolute tenacity into consideration), the fracture is always very short and the absolute resistance less. According to experiments by *Navier*, this resistance is 10 per cent. less in boiler-iron. The fracture in which the distinct strata or layers serving to form the bar, by welding, are perceptible, presents a flaky appearance; it is white when viewed by reflected light, and grey under incidental light; very often traces of fine steely grain are perceptible. It is in consequence of this being observed, that iron which is required to offer resistance in every direction, as, for instance, boiler-iron, is rolled, not only in the direction of its length and breadth, but also diagonally. The relative resistance is, in fact, less in a direction at right angles to that in which it was rolled; and pieces which require eight, ten, and even twelve blows with a hammer in order to break them in the direction of rolling, often break in the other direction at the third, fourth, or fifth blow. This phenomenon is of the greatest importance in the construction of cranks of railway axles, which are wrought in one piece.

A fracture in a transverse direction (relative resistance), is always whiter when effected by striking the bar upon the edge of an anvil, than when produced by the pressure of a weight in a longitudinal direction (absolute resistance), and the cause of this is the different manner in which the reflecting faces are presented to the light; in general it is not so veiny as the fracture in the longitudinal direction. If the different layers or strata of which the bar is composed are not well welded together, they will separate, and form facets of greater or less extent and smoothness. If these layers have not been well purified before welding, black spots will appear, consisting of carbon, or other impurities, which prevent their becoming perfectly united. In order to prove that the bar is perfectly welded, it is drawn out into a thin sheet, at a heat below welding heat, and if no flaw is then perceptible, the welding has been perfectly effected.

When striking the iron in order to break it, the fracture may be more or less modified, according to the weight of the hammer employed, the force of the blow, or the length of the piece detached. A long piece of iron, hammered with small hammers in one direction only, always presents a very veiny fracture, whilst when operated upon with heavy hammers, it presents a short fibrous or crystalline grainy texture. The fracture is always somewhat crystalline on its under surface, where the bar rested upon the anvil. When the fibres of the upper surface are broken or torn apart, those of the under surface are, in consequence, compressed or forced together, and shortened; these latter fibres are, therefore, seldom of a veiny character, but are generally of a fine steel-like grain. This is seen more especially when iron is broken by being bent backwards and forwards several times. I have often experienced this, and my observations on this head are in accordance with the experiments recently made on the Rhine railway, in which railway axles were broken, on the one hand, by means of a monkey weighing 1112 lbs. falling from a height of from 16 to 36 feet, and on the other by means of a hammer of very light weight.

I will state two of the experiments made upon the Rhine Railway, which appear to me to confirm the facts above stated:—A wrought or hammered iron axle, belonging to a railway waggon for transporting earth, was broken by the weight of 1112 lbs., falling a height of ten feet. The faces of the fracture were of a coarse crystalline character. The same axle, broken by several blows with the small hammer, presented all round the outside of the fracture a fine greyish grain, similar to cast-iron, and in the middle a grey crystalline texture. A rolled iron axle, which, on being broken by the weight, was crystalline, was, when broken by the small hammer, perfectly ductile and veiny.

On comparing the faces of the fracture of iron wrought by the hammer with that of rolled iron, the latter always appears more tenacious and veiny than the former. Forged iron is always of a less uniform character than rolled iron; it presents on the faces of the same fracture all degrees of texture, from the fine steel-like grain to the coarse crystalline grain, the whole combined with a veiny texture. In the former also more frequently than the latter, and especially in large pieces, flaws are met with, in consequence of imperfect welding. These facts arise from the rolling being performed in less time, and with more care and attention than work performed by the hammer. In this latter mode, too elevated a temperature may deteriorate the quality of the iron, and too low a temperature renders it brittle; a defect which may, doubtless, be afterwards remedied, but to which sufficient attention is not paid in forging.

In bars of rolled iron crystalline portions are frequently met with, which render those parts where they occur brittle. Amongst a great number of bars manufactured from the same casting, some will be found much inferior to others as regards the tenacity or veiny character of their texture.

In order to ascertain from what cause rolled iron acquires a crystalline texture in the process of manufacture, I undertook a series of experiments which I will now explain.

It is a well known fact that when the casting does not remain a sufficient length of time in the puddling furnace, or when that operation is not properly performed, so that all its particles may be sufficiently separated and brought into suitable contact with the flame passing over it, impure puddled iron will be obtained, containing portions of iron not completely refined, and also extraneous matter, such as silica, arsenic, sulphur, phosphorous, &c. This may be easily ascertained by the appearance of the fracture, which, in that case, will be grey and of an unequal character, of a short fibrous or coarse crystalline quality. It is also well known that if, after puddling and blooming, too low a welding heat is given under the hammer, a mechanical mixture of carbon and dross will remain in the iron (especially if on afterwards passing it between the rollers, the pressure is not sufficiently strong), and in that case the iron soon becomes brittle. It is however possible that, with too great a heat, the iron will retain its original granular texture, if it is not afterwards sufficiently worked, as will be seen from the following experiments:—

Choice was made of two puddling furnaces, both of which were charged with a similar quantity of the same casting, some days after putting them to work, and not till after they had acquired an equal temperature and worked regularly. This casting was worked in the same manner in both furnaces, and equal care was taken in performing the process of puddling. In one of these furnaces the blooms were removed immediately after refining, wrought under the hammer, and beaten flat to the size of about 6 inches in breadth and ¾ of an inch in thickness, and passed in this state through rollers having seven grooves. I then remarked, that under the hammer and between the rollers a large quantity of dross was separated, and the welding was effected with great facility.

In the other furnace the blooms were left 20 minutes longer, and then submitted to the hammer and rollers as before. By this mode of treatment less dross appeared in the blooms; but it appeared that the hammering and rolling were not performed with the same facility on these blooms of a dry nature; that particles of iron were detached even under the hammer; and that the bars, on coming from the rollers, were more flaky, and more full of flaws at the edges.

On examining the fractures made in these bars, the quality of the iron appeared in both cases identical. This fracture was of a fibrous quality, of a silver grey color, with here and there some projecting crystals; from this it was not thought necessary, during the other experiments, to classify the different sorts, and they were used indiscriminately.

I think proper to make an observation here upon the crystals, which were somewhat abundant in the iron after the first operation of the rollers:—When these crystals are very fine and of a clear color, their quality is good; they will disappear on being passed consecutively through the rollers; and the iron will be of very fine quality when the rolling operation is finished. This fact is well known in iron-works; and care is taken to put these crystalline bars on one side, as they are not required to be submitted to the test usually made of the work of the puddler. I have convinced myself of the truth of this, by forging a fine granular bar, which had passed through the first operation, and which, under the hammer, acquired a fine fibrous texture.

By this means the fact is therefore confirmed, that suffering the bloom to remain for any length of time in the puddling furnace has not an injurious influence upon the quality of the iron produced. It is, however, as well to remark, that in that case there will be greater waste of iron owing to the friability or dryness of the metal under the hammer. But it is also to be observed, that, by prolonging the application of heat in the puddling furnace, iron of good quality may be manufactured from casting of inferior quality. From this fact it has been proposed to apply heat for a longer time with an open register; a plan by which, it is true, better iron may be produced from an inferior material, but which has, however, been for the most part abandoned, as from the waste, consumption of fuel, and loss of time, the iron produced is more expensive than if castings of the best quality had been employed.

In order to determine the degree in which, in the successive operations of heating in the welding furnace, hammering into rectangular bars, and rolling, a change takes place in the iron, the following experiments were made:—

After examining the surfaces of fracture of all the rolled bars, and sorting them, they were made up into bundles of eight bars deep, and about five feet long, introduced into a welding furnace, and forged with a hammer of 2000 lbs. weight into rectangular bars, which were again introduced into the furnace, and afterwards rolled into bars of about $\frac{3}{4}$ of an inch in thickness.—

The pile, No. 1, was suitably heated and forged.
——— No. 2, ditto.
——— No. 3, was strongly heated and forged.
——— No. 4, less heated and forged.

Previously to passing them through the rollers they were operated upon as follows:—

No. 1, was again heated to a high temperature.
No. 2, — heated to the ordinary welding heat.
No. 3, — heated at a higher temperature than No. 1, until the upper part was burned and half converted into waste.
No. 4, — kept at the ordinary welding heat.

On examining a fracture made in the bars after rolling, the following results were observed:—

No. 1, which was kept at a good welding heat, both before hammering and rolling, had a clear and even fracture; some very small crystals were perceptible in several places, but they were for the most part oblong and not angular.

No. 2, also kept at a good welding heat, both before hammering and rolling, had a clear and even fracture, but some crystals were already perceptible.

No. 3, was brought to a great heat, both before hammering and rolling. The portion of the bar which was the most affected by the excess of heat, and which might besides be distinguished by its exterior flaky appearance, presented brittle edges, a structure entirely crystalline, and with very fine grains. Another portion, a little farther from that point, was half crystalline and half fibrous, but with short fibres. A third portion, nearer the extremity, was of a short fibrous texture, and had some small projecting crystals.

No. 4, which before hammering was less heated, and only carried to a suitable temperature before rolling, presented a fibrous texture, with some very small crystals, and was very similar to No. 2.

The granular portion of No. 3, having been heated nearly to welding heat, and again forged with a small hammer, the crystalline texture disappeared, and was changed into a short fibrous texture. The portion, a little less granular, of No. 3, treated in the same manner, was of a fine fibrous texture, of good quality, and a fine clear color.

The following facts result from these experiments, viz.:—

That No. 2, produced a fibrous iron, without crystals, when brought to a perfect welding heat, without, however, being overheated. No. 3, furnished a granulated iron when the heat was too great. No. 4, preserved its fine fibrous texture, even when overheated before hammering, when not overheated in the furnace before the consecutive rolling.

No. 1, furnished a more granulated texture when heated before the last rolling, than when heated before the hammering; and, lastly, the principal result of this latter mode of treatment is, that the iron easily becomes deteriorated; but that iron, which by a previous operation has been overheated, and has consequently become granular, may be brought back to the fibrous state. The experiment made by re-forging the granular iron, No. 3, is also in favor of this conclusion.

In practice, the property which wrought-iron possesses of becoming granular under a great heat, is profited by. In fact, it has often been proved, that iron with a very fine grain may be easily drawn very fine without flaw, and even be cut in small dimensions without flying to pieces or breaking. It is from this observation that all nail-iron is split whilst very hot. The nails manufactured are perfectly pointed, without flaws, and may be tempered to any degree of hardness and tenacity required.

In order to form a correct idea of the action of the rollers compared with that of the hammer, relatively to the grain of iron, I made the following experiment:—After having worked the iron in a puddling furnace, blooms about a foot square were placed one upon the other, and introduced in that position into the welding furnace; and after being sufficiently heated they were forged with a hammer of 1000 lbs. weight into a square bar, of between 5 and 6 inches in breadth. This bar was afterwards replaced in the furnace, and well rolled.

On afterwards examining iron manufactured in this manner, it was found, on comparison with that produced by the preceding process, that it was not drawn so well, that its fracture was more granular, and that this texture extended sometimes over the whole sectional surface. This grain, however, was not coarse, but was fine and of good quality, and of a nature to disappear on being again worked, as I was convinced when forging the iron again. In some places in the bar the different textures of the two blooms forming the bar could be distinctly seen, the one being of a long fibrous texture, and the other granular. It would seem from this, that the first method was more advantageous than the second, without reckoning another advantage, which consists in this, that immediately after the first rolling, the bars may be examined, and those of inferior quality placed on one side together; whilst, by the latter method, it is only after all the manufacture is completed, and when nothing else remains to be done, that any notion can be formed of the results. It would, therefore, be necessary that all the pieces which are required to be of a very fibrous or firm texture should be wrought by the rollers rather than the hammer; as, by the former, on the one hand, a more powerful pressure can be exerted than by the latter, and on the other hand, the drawing out of the grain being effected principally in a longitudinal direction, a more fibrous texture can be obtained.

With regard to the relative resistance which iron of a fibrous nature possesses, as compared with that of a granular character (the two methods of manufacture above mentioned only being considered), I have found that the tenacity, absolute as well as relative, and also the limit of elasticity, were less in the granular than the fibrous texture.

The absolute resistance offered by the granular iron was from 68 to 70 lbs., and the fibrous iron from 72 to 74 lbs., for every 25th of an inch square, the thickness of the bars being 6¼ inches by 7¾ inches.

As regards relative resistance, the granular is much inferior to the fibrous iron. Thus, in order to break it upon the anvil, fibrous iron required 18 or 20 blows of the hammer, whilst the granular iron only required 10 or 12, or at the utmost 15 blows.

The limit of elasticity was generally for the fibrous iron from 32 to 34 lbs. for every 25th of an inch square, and even extended to 38 lbs., whilst for the granular iron it stopped at 30 lbs. The progression of permanent extension, after the limit of elasticity has been exceeded, is not only less in the fibrous iron, but is also less regular in relation to the weight or force employed. I would also remark that the temperature at which the iron is rolled, and, above all, the degree of heat at which it is passed through the two or three last grooves of the rollers, has great influence upon the limit of elasticity. At a red heat, this limit may, for fibrous iron, be made to amount to 40 or 41 lbs. for every 25th of an inch square.

The following data of the difference between rolled and hammered iron were taken from experiments made upon the axles when the Rhine Railway was established.

1st. Nine axles, which had been in use (six being made of hammered and three of rolled iron), were placed upon supports, and a monkey weighing 1112 lbs. was allowed to fall upon them from a height of 16 feet. Of the six made of hammered iron four were broken and two bent, whilst those made of rolled iron were not injured in the least.

2nd. Six new axles, five hammered and one rolled, were submitted to the same test. Three of the five hammered axles were broken, and two bent, while the rolled axle was submitted to three blows of the monkey without being at all affected. From these facts the conclusion may be arrived at, that there exists a more intimate combination of the molecular particles in axles of rolled iron than in hammered iron, and also that they possess greater tenacity, while these latter, on the other hand, possess greater rigidity.

3rd. With regard to the hammered axles broken under the monkey, whether new or old, they in general presented a more crystalline fracture than the rolled axles, and very frequently flaws and cracks were detected.

4th. The observation has been already made that iron broken with a great weight presents a very different aspect to that broken by a small hammer; but we may add to this, that rolled iron will resist the blows for a length of time, and present a fibrous fracture, whilst the hammered iron presents a fine and somewhat steel-like grain, and breaks a long time before the rolled iron.

I will now proceed to the question as to the manner in which iron that has acquired a fibrous texture by the first manufacture may be deteriorated by subsequent operations.

It has been previously stated, that when the welding heat is too great, the fibrous texture of the iron will be changed into a granular crystalline texture. This transformation may be easily studied by welding two pieces together. I have frequently repeated the experiments which I will now describe, and have invariably observed the following results:—

The fractures of two bars of iron, 2 feet in width, and 1⅜ inch in thickness, on being examined, presented an equally fibrous texture. Their extremities were then hammered at a high temperature, until the thickness was reduced to ¾ inch, and afterwards brought to a very high welding heat, and welded together by hand. After being left until quite cool, they were struck upon the edge of an anvil, at the welding point. This welding had been completely successful, and even at those points the iron was of a fibrous texture. On cutting through the bar, at a distance of 2 inches from the welding, the texture was still crystalline, but more especially at the edges. At a distance of about 3 inches the iron was still less crystalline, and at 6½ inches the fibre of the iron was found not to have undergone any change.

In other bars which were cut, the fibre of the iron was found perfect nearer the welding point, and at not more than 4 or 5 inches therefrom; this arose probably from a less length of bar having been heated.

The conclusion may therefore be drawn, that too high a welding heat will invariably render the iron crystalline; but that if two bars are welded together, the welded parts will not retain the crystalline form, which arises from the crystalline particles being flattened by the blow of the hammer, and rendered fibrous. I will not be certain, however, whether the blows of the hammer, which ought only to act upon the welded parts, do not assist in the crystallization of the adjacent parts; but this is certain, that if the phenonema which present themselves on the crystallization of liquid bodies be taken into consideration, for instance, the fact that ice, even in still water, is not formed at 5° or 8° below zero, but is formed on the slightest disturbance of the water, it is to be presumed that the shocks produced by the blows of the hammer upon iron heated to a high temperature, and which, in that state, approaches the point of fusion, may not be without influence. At any rate a categorical answer to this question is not absolutely necessary for the case in point, and the fact may be considered to be clearly demonstrated, that a strong white welding heat renders fibrous iron crystalline. I have convinced myself of this fact by a great number of experiments, even without having recourse to simultaneous welding.

In these experiments it might be objected that the working of the iron produced the crystalline texture; but I caused bars to be cut which had been worked from a red to a deep orange red, and I found that in the parts worked, the iron fibre, although somewhat shortened, and therefore scarcely perceptible, did not present any absolute alteration in the adjacent parts. It is, however, different with regard to iron worked at a high temperature; the crystalline structure is perceptible in this case, and in a greater degree than in a bar which was simply heated.

With regard to the resistance of that portion which became granular by the application of a white heat, it appears, from my experiments, to present some analogy with that of the kinds of iron which have remained granular from a previous treatment. It may be, however, that a greater or less degree of white heat has some effect on the quality of the iron. Besides, the temperature at which one sort of iron may be welded is not the same for other sorts. With several kinds, this temperature was so high that the point of fusion was very near the welding point; but, in general, iron of this kind is not fit for welding.

After having thus convinced myself by experience that iron acquired a granular texture when heated to a very high temperature, I made experiments with regard to the manner in which it was effected, as to whether certain results could not be obtained in working.

In order to assure myself whether simple heating without hammering would produce a change, I caused the bar No. 3, above mentioned, which had been heated to a very high temperature in the welding furnace, to be cut into two portions; one of these portions was brought to a red and the other to a white heat, but not to a welding heat: I had previously hammered portions of these two bars, and I repeated this operation upon the bars after being heated. In one of these portions (that which had been brought to a red heat) the fractures of the parts hammered in a cold and hot state, were identical,—both were granular and crystalline; the resistance offered when struck upon the edge of the anvil was also very considerable, both before and after heating, which had not been supposed from inspection of the fracture. The color was the same in the other portion carried to a white heat, and it was not different from the former either in the fracture or resistance. I also caused the bar No. 4, which had been first heated in the welding furnace, and then carried in the same furnace to a moderate welding heat, to be cut into two pieces, one of which was heated to a red and the other to a white heat. The results with both these portions were identical, after heating and under the hammer, as respects the fracture, the color, and the resistance. The conclusion from this would seem to be, that re-heating iron to a heat less than full white heat has not any injurious influence upon the metal.

In order to get a correct idea of the changes which the iron undergoes when worked at a heat less than the welding heat, I took a certain number of bars, which I rolled out at a good red heat, and I remarked that the ductility, and also the absolute resistance and limit of elasticity were thus augmented in the iron, which is in accordance with a well-known fact, viz :—that iron thus treated, when broken upon the edge of the anvil, presents less resistance, which is owing to an increase in density, and also to the fact that the iron having thus lost part of its elasticity and tenacity, becomes of a more brittle and rigid nature. My experiments on this head were made upon bars from an inch to an inch and a half in thickness, and consequently the results were not, perhaps, very conclusive, for which reason I will not enter into the details ; but as some experiments have been made upon pieces of large dimensions on the Rhine railway, I will mention some few which appear worthy of notice.

A rolled axle, with forged pins and welded shoulder, was submitted to the action of the monkey, in such a manner that one of its spindles received the blow, the monkey falling from a height of 36 feet. The spindle was broken, and the axle bent and crushed, and the shock was such that the other spindle was broken and thrown up a height of more than 12 yards. The fracture in the spindles was grey, of a rather fine granular texture ; one of them, however, contained a layer of crystalline iron.

An axle, consisting entirely of rolled iron, was hammered at one end, while in a hot state, but so as to lose none of its strength. The monkey was allowed to fall upon it from a height of 16 feet, at a distance of an inch and a half from the forged end. The rolled part of the axle was somewhat curved, but the wrought portion was scarcely affected. The axle was then hammered all over, and left in the open air all night. The next day, on being again submitted to the monkey, from a height of 16 feet, it broke in the middle, and bent very little. The fracture was found to consist of a crystalline granular texture, of middling size and light color.

In these experiments it will be observed, that the axles were broken by the fall of a heavy weight, which is the reason that the faces of the fracture appeared more crystalline. If they had been broken by blows with a small hammer, this would not have been the case ; at least I have never found, although I have made a great number of experiments on this head, that by hammering at a red heat (when the iron had not been submitted to any operation of a nature to deteriorate it) the fibrous texture has disappeared. When, however, the rupture is effected by the monkey, the fibres of the iron, rendered dense and brittle, separate violently and instantaneously, and the fracture acquires a granular aspect, but the fibre is nevertheless not destroyed. The drawing out of the iron into rods is a conclusive proof of this, and another experiment made on the Rhine railway furnishes further evidence of the fibre not being injured.

In order to ascertain whether rolled axles which are submitted to a second welding heat and hammered by hand would thereby lose their tenacity, an axle was broken with small hammers in the part wrought. The fracture presented no alteration, but was, on the contrary, remarkably fibrous and tenacious. It is, therefore, evident that this case is not precisely similar to the preceding ones, and yet the iron had been hammered at a welding heat. It may, therefore, be concluded from this experiment, that when the hammering is not very violent, and the iron is not worked at a greater heat than red heat, it will not be rendered brittle, and this result I have always seen confirmed in working large pieces.

It now only remains to inquire how to avoid rendering iron brittle by hammering, and if that be not possible, how that defect may be made to disappear. Iron is always brittle in some degree, but hammer-forged iron is always denser and harder, When, however, the hammering is performed at a low welding heat, and when, on being re-heated, it is not raised above that temperature, the hammering will have but little influence in augmenting its brittleness. If, through necessity or negligence, iron has been worked at a low heat, the brittleness may be diminished by heating the iron to a dull red, and letting it cool slowly, as has been proved by Mr. Nasmyth's experiments. It is not easy to determine whether by re-heating the cohesion or tenacity of hammered iron is diminished in the same degree as rolled iron, for in neither can the action of the various influences be distinguished, and a comparison is, consequently, impossible. According to the experiments of M. Brix upon the resistance of rod-iron, the absolute resistance of the rods which had been reheated was never less than the resistance of the bar-iron from which they were drawn. My observations upon the re-heating of iron renders it probable that drawn iron is, in a slight degree, softer than before that operation. But, as in the latter case, the absolute resistance had somewhat diminished, I have not yet had time to assure myself by direct proof, although the density had evidently augmented.

It is very seldom necessary to submit bar-iron which is to be exposed to various causes of rupture to cold hammering, and it is never indispensable.

List of Disclaimers
OF PARTS OF INVENTIONS AND
Amendments

MADE UNDER LORD BROUGHAM'S ACT.

Disclaimer allowed by Her Majesty's Attorney-General, on the 14th March, 1846, and filed with the Clerk of the Patents, on the 11th April, 1846, to the specification of a patent granted to John Grantham, of Liverpool, engineer, on the 8th day of December, 1842, for certain improvements in the constructions and arrangements of the engines and their appendages for propelling vessels on water.

Memorandum of alteration allowed by Her Majesty's Attorney-General, on the 29th December, 1845, and filed on the 23rd April, 1846, with the Clerk of the Patents, to the title of a patent granted on the 23rd October, 1845, to Joseph Orsi, of Pimlico, Gent., for improvements in sleepers or blocks for supporting railways.

LIST OF REGISTRATIONS EFFECTED UNDER THE ACT FOR PROTECTING NEW AND ORIGINAL DESIGNS FOR ARTICLES OF UTILITY.

1846.

Mar. 30. *John Coope Haddan*, of Upper Woburn-place, Russell-square, London, for under framing for railway carriages.

30. *Robert Tibbins*, of Birmingham, for a design for close casing for the handles of telescope hearth-brushes and toasting forks.

31. *James Dixon & Sons*, of Cornish-place, Sheffield, for a handle.

Apr. 3. *George Betjeman*, of 6, Upper Ashley-street, Clerkenwell, London, for an improved design for dressing-cases and dressing-tables; also for work-boxes, work and toilet-tables.

4. *Gabriel Davis*, of Boar-lane, Leeds, Yorkshire, for a folding level staff.

6. *Louis Nathan*, of 31, Great Prescott-street, Goodman's Fields, London, for an alarum for time-pieces.

6. *Joseph Walters & Company*, of 82, London-wall, city of London, for an embossing press.

Apr. 7. *Miller & Sons*, of 179, Piccadilly, for a railway signal lamp.

8. *William Saddler Kennedy*, of Burslem Staffordshire Potteries, porcelain manufacturer, for an improvement in the mode of mounting knobs and roses.

11. *Julius Hall*, of Bath, for a velocipede guide-wheel.

11. *David Hesse*, of No. 8, Back Piccadilly, Manchester, for the "imperial shirt."

11. *Alfred Mortimer* and *Benjamin Whitfield Nott*, of No. 35, Bread-street, Cheapside, for a stop-valve oil-can.

11. *Shoolbred, Loveridge, & Shoolbred*, of Wolverhampton, japanners, for a sponging bath.

15. *Alexander Grant & Brother*, of Clement's-court, Wood-street, for the "demi shirt."

15. *Thomas Key*, of 20, Charing Cross, military instrument-maker, for the "Sax Valve French Horn."

16. *Thomas Key*, of 20, Charing Cross, military instrument-maker, for a four-valve cornet-à-piston (or cornopean), trumpet, trombone, and ophecleide.

17. *Miller & Sons*, of 179, Piccadilly, for a railway signal lamp.

17. *Fenton & Marsden*, of Sheffield, Yorkshire, for a brace-head.

17. *Thomas Hemingsley*, of Willenhall, Staffordshire, for a machine for cutting washers.

20. *James Dixon & Sons*, of Cornish-place, Sheffield, for a percussion cap primer.

23. *Richard Clark*, of 447, Strand, lamp manufacturer, for the "Diamond Carcel Lamp."

27. *William Colbourne*, of the firm of Ward, Colbourne, and Gillett, for a hand seed depositor.

List of Patents

That have passed the Great Seal of IRELAND, from the 23rd March to 20th April, both inclusive.

To William Shaw, of Canning-place, Liverpool, in the county of Lancaster, for a machine for paging books and numbering documents consecutively and otherwise, and for printing dates, words, marks, numbers, or impressions, in an expeditious manner.—Sealed 23rd March.

John Ainslie, of Alperton, in the county of Middlesex, brick and tile manufacturer, for certain improvements in the arrangements for the manufacture of bricks, tiles, and other similar articles, from clay and other plastic substances, and in machinery or apparatus for the manufacture of bricks.—Sealed 27th March.

Frederick Rosenborg, of the borough of Kingston-upon-Hull, Gent., and John Malam, also of the same borough, Gent., for certain improvements in, or apparatus for, watering, manuring, and drying, trees, plants, seeds, and roots, and for accelerating and improving the growth and produce of trees, plants, seeds, and roots.—Sealed 27th March.

William Edward Newton, of the Office for Patents, 66, Chancery-lane, in the county of Middlesex, civil engineer, for improvements in the preparation or manufacture of thread or yarn,—being a communication.—Sealed 28th March.

Henry Dircks, of Nicholas-lane, in the city of London, engineer, for improvements in the means of obtaining and preparing extracts from certain vegetable matters, and in the apparatus connected therewith, which apparatus may be also applied to other similar purposes.—Sealed 1st April.

William Unsworth, of Derby, silk manufacturer, for certain improvements in looms for weaving.—Sealed 1st April.

Charles Tetley, of Bradford, in the West Riding of the county of York, stock and share broker, for certain improvements in the means of raising and impelling water and other liquids; or in machinery for such purpose or purposes; and also thereby to obtain mechanical power.—Sealed 3rd April.

Moses Poole, of Serle-street, London, Gent., for improvements in filling bottles and other vessels; and also in covering, stopping, or securing liquids and other matters in bottles and other vessels,—being a communication.—Sealed 3rd April.

Wilton George Turner, of Gateshead, in the county of Durham, doctor in philosophy, for an improved mode of treating guano, for the purpose of obtaining chemical compounds therefrom. Sealed 9th April.

John Lake, of Apsley, in the county of Hertford, civil engineer, for certain improvements in propelling. Sealed 15th April.

John Nott, of the city of Cork, Gent., for improvements in the means of communicating intelligence from one place to another.—Sealed 20th April.

James Laming, of Mark-lane, in the city of London, merchant, for improvements in making the cyanides and ferrocyanides of potassium and sodium,—being a communication.—Sealed 20th April.

List of Patents

Granted for SCOTLAND, subsequent to March 22nd, 1846.

To Julius Adolph Detmold, of the city of London, merchant, for improvements in the means of applying steam as a motive power,—being a communication from abroad.—Sealed 23rd March.

Alexander Bain, of Hanover-street, Edinburgh, engineer, for improvements in electric clocks and telegraphs, parts of which improvements are applicable to other purposes.—Sealed 25th March.

James Ivers, of Preston, in the county of Lancaster, machine-maker, for certain improvements in machinery or apparatus for preparing, roving, and slubbing cotton, wool, and other fibrous substances.—Sealed 30th March.

James Stokoe, of Newton, in the county of Northumberland, millwright, for improvements in purifying the vapours arising from smelting and other furnaces, and in recovering therefrom the useful matters which may be intermixed therewith.—Sealed 2nd April.

William Mather and Colin Mather, of Salford, in the county of Lancaster, engineers, for certain improvements in boring earth, stone, and subterraneous matters; and in the machinery, tools, or apparatus applicable to the same.—Sealed 2nd April.

Charles Cowan, paper manufacturer, in Valleyfield, near Penicuick, in the county of Edinburgh, for improvements in the manufacture of paper, mill-board, and other similar substances, which is partly his own invention and partly the invention of a foreigner.—Sealed 3rd April.

George Daniel Bishopp, of Paddington, in the county of Middlesex, civil engineer, for improvements in certain engines or machines used for obtaining mechanical power, and for raising and impelling fluids.—Sealed 6th April.

Henry Smith, of Liverpool, engineer, for improvements in the manufacture of wheels for railways, and in springs for railway and other carriages, and in axle-guards for railway carriages.—Sealed 6th April.

William Unsworth, of Derby, silk manufacturer, for certain improvements in looms for weaving.—Sealed 7th April.

Pierre Armand le Comte de Fontainemoreau, of Skinners-place, Sise-lane, in the city of London, for certain improvements in apparatus for raising and supporting vessels and other floating or sunken bodies; and its application for the better protection of life and property,—being a communication from abroad.—Sealed 9th April.

Henry Mandeville Meade, of the city of New York, in the United States of America, Gent., for improvements in the manufacture of bread,—being a communication from abroad.—Sealed 9th April.

Henry Mandeville Meade, of the city of New York, in the United States of America, Gent., for improvements in distilling from Indian corn and other grain,—being a communication from abroad.—Sealed 9th April.

Benjamin Fothergill, of Manchester, in the county of Lancaster, machine-maker, for improvements in certain parts of machinery used in the preparation for spinning, and in the spinning and doubling of cotton, wool, and other fibrous substances.—Sealed 9th April.

John Robert Johnson, of Alfred Place, Blackfriars, in the county of Surrey, chemist, for improvements in purifying gas, and in the treatment of products of gas works.—Sealed 9th April.

Reuben Goodale Fairbanks, of Cecil-street, in the county of Middlesex, civil engineer, for certain improvements in machinery or apparatus for making, moulding, or manufacturing bricks, tiles, and other articles, from earthy or plastic materials, —being a communication from abroad.—Sealed 13th April.

Alexander Alliott, of Lenton, in the county of Nottingham, for certain improvements in the rotary machines employed for drying, and other purposes requiring the application of centrifugal force.—Sealed 14th April.

John Ainslie, of Alperton, in the county of Middlesex, brick and tile manufacturer, for certain improvements in the arrangements for the manufacture of bricks, tiles, and other similar articles, from clay and other plastic substances, and in machinery or apparatus for the manufacture of bricks.—Sealed 14th April.

James Laming, of Mark-lane, in the city of London, merchant, for improvements in making the cyanides and ferrocyanides of potassium and sodium,—being a communication from abroad.—Sealed 15th April.

James Allingham, of Dublin, in the kingdom of Ireland, Gent., and James William Mc Gauley, of the city of Dublin, aforesaid, clerk, for certain improvements in steam-engines.—Sealed 16th April.

John Lake, of Apsley, in the county of Hertford, civil engineer, for certain improvements in propelling.—Sealed 16th April.

Samuel Heseltine, jun., of Bromley, in the county of Middlesex, civil engineer, for improvements in machinery or apparatus for dressing stones for grinding corn, grain, and other substances, —being a communication from abroad.—Sealed 17th April.

William Mather, of Salford, near Manchester, in the county of Lancaster, and Colin Mather, of the same place, millwrights and engineers, for improvements in metallic pistons.—Sealed 21st April.

Edouard Auguste Desire Guichard, of Rue des Jenueurs, Paris, in the kingdom of France, for improvements in printing calico and other fabrics.—Sealed 21st April.

Extension of Bennet Woodcroft's patent to six years, for certain improvements in the construction and adaptation of a revolving spiral paddle for propelling boats and other vessels in water.—Sealed 21st April.

New Patents

SEALED IN ENGLAND.

1846.

To William Henry Moggridge, of 13, Old Burlington-street, Middlesex, dentist, for certain improvements in the plates or pieces for the roof and gums of the mouth, for attaching thereto artificial teeth. Sealed 31st March—6 months for inrolment.

John Ainslie, of Alperton, in the county of Middlesex, brick and tile manufacturer, for certain improvements in the arrangements for the manufacture of bricks, tiles, and other similar articles from clay and other plastic substances, and in the machinery or apparatus for the manufacture of bricks. Sealed 31st March—6 months for inrolment.

William Spiby, of Carrington, in the county of Nottingham, engineer, for improvements in the construction of furnaces used for heating water and other fluids. Sealed 1st April—6 months for inrolment.

Harold Potter, of Darwen, in the county of Lancaster, paper manufacturer and stainer, for improvements in printing or staining paper. Sealed 1st April—6 months for inrolment.

Henry Crosley, of King William-street, London, engineer, for certain improvements in the manufacture of sugar, and in the machinery and apparatus employed therein. Sealed 3rd April —6 months for inrolment.

Ferdinand Charles Warlick, of Deptford, in the county of Kent, Gent., for improvements in the manufacture of fuel. Sealed 7th April—6 months for inrolment.

William Thomson, of Kilmarnock, North Britain, manufacturer and fur merchant, for improvements in machinery for operating upon wool and other fibrous material intended to be wrought into felted fabrics. Sealed 7th April—6 months for inrolment.

George Lewis, of High Cross-street, Leicester, locksmith, for improvements in the construction of shutters and blinds for windows and doors, and in the construction of doors. Sealed 7th April—6 months for inrolment.

James Allingham, of Dublin, Gent., and James William Mc Gauley, of the same place, clerk, for certain improvements in steam-engines. Sealed 7th April—6 months for inrolment.

Joseph Hunt, of Brixton, Surrey, chemist, for improvements in the manufacture of soda. Sealed 9th April—6 months for inrolment.

Joseph Bunnett, of Deptford, engineer, for certain improvements in water-closets; part of which improvements is applicable to other useful purposes. Sealed 15th April—6 months for inrolment.

Pierre Armand le Comte de Fontainemoreau, of New Broad-street, London, for an improved mode of constructing certain parts of the harness of horses and other beasts of burden,—being a communication. Sealed 15th April—6 months for inrolment.

Simeon Hyde, of the Strand, merchant, for improvements in refrigerators. Sealed 15th April—6 months for inrolment.

William Tutin Haycraft, of Greenwich, doctor of medicine, for improvements in steam engines. Sealed 15th April—6 months for inrolment.

Charles May, of Ipswich, Suffolk, civil engineer, for improvements in machinery for punching, rivetting, and shearing metal plates. Sealed 15th April—6 months for inrolment.

Henry Mandeville Meade, of the city of New York, in the United States of America, Gent., for improvements in preparing food for animals when Indian corn is used,—being a communication. Sealed 15th April—6 months for inrolment.

Elijah Galloway, of Buckingham-street, Strand, engineer, for improvements in locomotive engines. Sealed 18th April—6 months for inrolment.

Joseph Clinton Robertson, of Fleet-street, civil engineer, for certain improvements in the manufacture of pins,—being a communication. Sealed 18th April—6 months for inrolment.

John Gillett, of Brailes, of the firm of Ward, Colbourne, and Gillett, of Stratford-on-Avon, and Brailes, near Shipston-on-Stour, in the county of Warwick, agricultural implement makers, for an improved machine or machines for cutting, slicing, and otherwise dividing hay, straw, turnips, and other vegetable substances. Sealed 18th April—6 months for inrolment.

Peter Bishop, of Birmingham, bayonet manufacturer, for a certain improvement or certain improvements in the manufacture of bayonets. Sealed 21st April—6 months for inrolment.

William Howard Bell, of Edmondsley, near Chester-le-Street, in the county of Durham, for improvements in working coal in coal mines. Sealed 21st April—6 months for inrolment.

Arthur Philip Perceval, of East Horsley, in the county of Surrey, clerk, for improvements in communicating between places separated by water. Sealed 23rd April—6 months for inrolment.

William Ashby, of Croydon, in the county of Surrey, millwright, for certain improvements in the manufacture of flour. Sealed 25th April—6 months for inrolment.

George Philcox, of High-street, in the borough of Southwark, watch-maker, for improvements in the construction of chronometers and other time-keepers. Sealed 25th April—6 months for inrolment.

CELESTIAL PHENOMENA FOR MAY, 1846.

D.	H.	M.	
1			Clock after the sun 3m. 2s.
	—		☽ rises 9h. 7m. M.
	—		☽ passes mer. 4h. 52m. A.
	—		☽ sets Morn.
	4	51	☿ stationary
	15	4	Juno oppo. to the ⊙ intens. of light 0·330
2	20		☽ in Apogee
3	11	52	☽ in □ or first quarter
3	17		♂ in conj. with *B*. Tauri
4	19	45	☿ in Aphelion
			Occul. C. Sextantes im. 9h. 41m. em. 10h. 53m.
5			Clock after the sun, 3m. 28s.
	—		☽ rises 1h. 16m. A.
	—		☽ passes mer. 7h. 48m. A.
	—		☽ sets 1h. 47m. M.
8			Occul. 58 Virginis, im. 10h. 33m. em. 11h. 7m.
10			Clock after the sun, 3m. 49s.
	—		☽ rises 6h. 58m. A.
	—		☽ passes mer. 11h. 44m. A.
	—		☽ sets 3h. 49m. M.
11			Occul. β1 Scorpii im. 12h. 24m. em. 13h. 18m.
11	4	19	♀ greatest elong. 46. 1. W.
	6	6	Ecliptic oppo. or ○ full moon.
14	8	3	♃ in. conj. with the ⊙
15			Clock after the sun, 3m. 55s.
	—		☽ rises 11h. 45m. A.
	—		☽ passes mer. 3h. 33m. M.
	—		☽ sets 8h. 8m. M.
	7		☽ in Perigee
16	3	8	☿ in conj. with Ceres, diff. of dec. 4. 7. N.
	12		♂ in conj. with Vesta diff. of dec. 0. 47. S.
	13	36	☿ greatest elong. 25. 29. W.
17			Mercury R. A. 1h. 58m. dec. 8. 34. N.
	—		Venus R. A. 0h. 40m. dec. 2. 37. S.
	—		Mars R. A. 6h. 16m. dec. 24. 36. N.
	—		Vesta R. A. 6h. 16m. dec 23. 51. N.
17			Juno R. A. 14h. 41m. dec. 0. 14. S.
	—		Pallas R. A. 23h. 57m. dec. 4. 12. N.
	—		Ceres R. A. 1h. 57m. dec. 4. 17. N.
	—		Jupiter R. A. 3h. 28m. dec. 18. 5. N.
	—		Saturn R. A. 22h. 11m. dec. 12. 36. S.
	—		Georg. R. A. 0h. 47m. dec. 4. 25. N.
	—		Mercury passes mer. 22h. 19m.
	—		Venus passes mer. 21h. 0m.
	—		Mars passes mer. 2h. 37m.
	—		Jupiter passes mer. 23h. 46m.
	—		Saturn passes mer. 18h. 29m.
	—		Georg. passes mer. 21. 5.
	23	34	♄ in conj. with ☽ diff. of dec. 6. 29. S.
18	1	27	☽ in □ or last quarter
19	3	2	♀ in conj. with ♅ diff. of dec. 1. 7. S.
20			Clock after the sun 3m. 47s.
	—		☽ rises 1h. 43m. M.
	—		☽ passes mer. 7h. 59m. M.
	—		☽ sets 2h. 28m. A.
	23	3	♅ in conj. with the ☽ diff. of dec. 2. 58. S.
21	2	23	♀ in conj. with the ☽ diff. of dec. 4. 1. S.
	12	2	♄ in □ with the ⊙
22	18	10	☿ in conj. with the ☽ diff. of dec. 3. 14. S.
24	2	4	♃ in conj. with the ☽ diff. of dec. 0. 56. N.
25			Clock after the ⊙ 3m. 26s.
	—		☽ rises 4h. 20m. M.
	—		☽ passes mer. 0h. 1m. A.
	—		☽ sets 8h. 12m. A.
	4	44	Ecliptic conj. or ● new moon
	6	17	☿ greatest hel. lat. S.
27	16	45	♂ in conj. with the ☽ diff. of dec. 5. 55. N.
30	15		☽ in Apogee

The Satellites of Jupiter are not visible this Month, Jupiter being too near the Sun.

J. LEWTHWAITE, Rotherhithe.

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RECENT PATENTS.

To Thomas Taylor, *of Manchester, cabinet-maker, for certain improvements applicable to machinery or apparatus employed for sawing timber.*—[Sealed 23rd October, 1845.]

These improvements in sawing timber apply, firstly, to such machinery wherein the circular saw is employed, and are designed to effect a considerable saving in the cutting of the timber, and also to obtain a greater amount of work in a given time, with less power, than by the use of the common apparatus. These improvements are accomplished principally by employing much thinner saws than usual, and by keeping the cutting edge parallel with the "fence" or bed, against which the plank is cut, and also by keeping the saw cool during the cutting operation; thus preventing the "buckling" to which it is liable on becoming expanded by heat. Secondly, these improvements apply to the sharpening of the teeth of saws, and are intended to supersede the use of files, as commonly employed for such purposes.

In Plate XIII., fig. 1, represents a plan or horizontal view of an ordinary circular saw-frame, with the first part of the improvements attached thereto; fig. 2, is a side elevation, with part of the framing removed; and fig. 3, a transverse section of the same. *a, a,* is the framing of the apparatus; *b, b,* the bed or table upon which the timber is cut; *c, c,* the driving-pulley; and *d, d,* the circular saw. This saw is mounted upon the spindle *e, e,* and is adjustable in its bearing by means of the set-screws *f, f.* There are also iron plates *g, g,* (see fig. 3,) upon each side of the saw, furnished with pegs of box-wood *h, h,* and adjustable to the parallel of the saw by means of the set-screws *i, i.* *k, k,* are two pegs of box-wood, for the purpose of securing the exact perpendicular position of the saw. Thus it will be seen, that the saw may be adjusted in every direction with the greatest nicety; and, when so adjusted, is held in the required position, and prevented from vibrating by the pegs *h, h,* and *k, k;* by which means a much thinner saw than ordinary may be used; and, consequently, a considerable saving in the timber will be effected. When the saw becomes heated by the friction against the timber it begins to expand, and bulges or buckles between the centre and its circumference, which the workman will readily perceive by the vibration of the saw and the unevenness of the cut; the tap *l,* is then to be turned, and thus cause water to flow along the pipe *m,* and cool the saw at or near the centre; and also by turning the tap *m*,* water is caused to flow along the forked pipe *n,* upon both sides of the edge or circumference of the saw. Thus the saw may be kept quite cool, and worked continuously for any length of time, still keeping perfectly parallel and true to the work it has to perform. The piece of timber *o, o,* under operation is pressed by the spring *p,* and roller *q,* against the fence *r,* which serves as a bed, against which the timber is cut, and also as a gauge to determine the thickness of the plank. This fence *r,* is adjusted by means of the sliding-bar *s, s,* and parallel levers *t, t,* being set accurately by the right and left-hand screws *u, u,* and *v, v.* The timber is forced against the saw by means of the drag-rope or cord *w, w,* passing around the pulley or barrel *x,* which is driven by gearing and hand-pulleys from the main driving-shaft. As soon as the plank is cut, the small pinion *y,* is thrown out of gear with the spur-wheel *z*, and the rope *w*, *w*, is carried forward by the workman, and hooked on to another piece of timber, when the operation will proceed as before.

The second part of this invention is exhibited at figs. 4, 5, 6, and 7; fig. 4, representing a plan or horizontal view, and fig. 5, a side view of an arrangement of machinery or apparatus for the purpose of sharpening the points of the teeth of the saw, and producing an uniformity in the bevil of the edge of the same. The saw *a*, *a*, is placed upon the moveable table *b*, *b*, and held there by means of the set-screw *c*, *c*;—*d*, is a disc of copper, fixed upon the end of the spindle *e*, mounted in the headstock *f*. This disc and spindle are caused to revolve rapidly by the band *g*, passing around the pulley *h*, and an oscillating motion is given to the headstock *f*, by its being connected to the crank-pin *i*, by the levers *k*, *k*; the tooth of the saw *a*, is placed in contact with the disc *d*, which, on applying oil and fine emery, will bring the points of the teeth to the finest edge; at the same time ensuring the uniformity of bevil on the edge of each tooth. Each alternate tooth of the saw being thus sharpened and bevilled upon the edge, the saw is turned over, and the disc caused to revolve in the opposite direction, by crossing the driving-band, or otherwise. The intermediate teeth of the saw are then brought under operation, and bevilled to the same angle, but in the reverse direction.

Fig. 6, shews a plan view, and fig. 7, a side view of an arrangement of apparatus for sharpening the "gullet" or bottom of the tooth. The general arrangement of this apparatus is similar to that above described, excepting that a copper roller or spindle *d*, (instead of a disc) is, in this instance, employed, and the reciprocating motion is given to the spindle *e*; the headstock *f*, being fixed. *i*, *i*, is a small worm driven by the band *k*, passing around the pulley *b*, and actuating the worm-wheel *m*; this wheel *m*, is furnished with a crank-pin *n*, which gives the requisite vibratory motion to the spindle *e*, by means of the forked lever *o*, and links *p*, *p*. This contrivance, by the application of emery and oil to the roller *d*, will bring the under side of a tooth to a smooth and fine edge. When the gullet of every alternate tooth has been thus sharpened, the saw is turned over, and the intervening teeth operated upon as above described. In both of these arrangements the bevil upon the edge of the tooth may be varied by altering the position of the leg *r*, which supports the table *b*, *b*; and the bevil upon the top of the tooth in the former, and the amount of hook given to the tooth in the latter case may be varied, by altering the relative position of the centre of the saw with respect to that of the headstock, by shifting the set-screws *s*, *s*. Thus any required shape of tooth and amount of bevil may be given, at the same time that the perfect uniformity of each tooth is secured.

The patentee claims, Firstly,—the method of preserving the correct parallel and vertical position of the saw, as above described; also the apparatus for setting the "fence" parallel and true; and the spring and roller for keeping the timber against the fence. Secondly,—the method of cooling the saw when required, by causing water to flow upon the same. Thirdly,—the apparatus for "dragging" the timber through the saw frame. With respect to the sharpening apparatus, the patentee claims the use of the copper disc or roller, used in combination with fine emery and oil, for the purpose of sharpening the teeth of saws; and Lastly,—the general arrangement, of the whole of the apparatus, as above described and exhibited in the drawing.—[*Inrolled in the Petty Bag Office, April,* 1846.]

Specification drawn by Messrs. Newton and Son.

To Julius Adolph Detmold, *of the city of London, merchant, for an invention of improvements in the means of applying steam as a motive power,—being a communication.*—[Sealed 21st July, 1845.]

This invention consists in taking steam, generated in the usual way, in an ordinary boiler, and subjecting it to a high degree of heat before it is allowed to pass into the cylinder of the steam-engine; and also subjecting the cylinder to the action of heat, in order to maintain the steam contained therein at a proper pressure. By these means an increased volume of steam, of an increased tension, is obtained, and the temperature of the steam, while operating in the cylinder, is maintained to a considerable degree.

It will be evident to every intelligent engineer that the means or arrangement of parts, whereby this invention may be carried into effect, must be varied according to the circumstances of each particular case; and that, even when similar cases occur, the improvements may be applied in a variety of different ways; the patentee does not, therefore, intend to confine himself to any particular arrangement or construction of parts; but, in order that the manner of carrying out the invention may be clearly understood, a mode of applying the invention to the boiler of a stationary engine is shewn.

In Plate XV., *a, a,* is an ordinary boiler, with tubular flues *b, b, b*; (the boiler is mounted in brick-work or masonry) *c, c,* is the chimney or stack, which conveys away the smoke; *d, d,* is the fire-place; and *e,* is a dome, which forms part of the steam-space of the boiler, and is filled with steam, which escapes therefrom through the copper pipe or tube *f, f.* The upper end of this tube has a covering, lid, or valve *g,* adapted to it; this valve is fixed on the lower end of a vertical rod *h,* which is furnished with a handle, as seen in the drawing, whereby it is moved up and down, and the end of the tube is thereby opened or closed at will, so as to regulate the quantity of steam which passes through the tubes. *i,* is the safety-valve; and *j, j, j,* is the steam-heating apparatus, consisting of a worm or coil of copper tubing, connected at one end to the horizontal steam-pipe *f, f*; its opposite end being in communication with the valve-box *k,* of the working cylinder *l*; *m,* is the piston-rod, which communicates motion from the piston in the cylinder to any machinery that may be required to be driven.

From this explanation of the different parts of the apparatus it will be seen, that the steam from the steam-space in the boiler first enters the pipe *f, f,* and from thence passes into the heating apparatus or worm or coil *j, j,* where, by its exposure to the heat of the furnace, its temperature is much increased; and after circulating through the whole length of the coil, the steam eventually enters the cylinder *l*, through the valve-box *k*.

If it is required to apply the invention to locomotive boilers, the apparatus must be differently arranged; for instance, instead of placing the cylinders of a locomotive engine immediately above the furnace, as shewn in the drawing, they should be placed in the smoke-box, at the end of the boiler, as is often done at present; and the heating apparatus or coil or worm, in which the steam is heated, may also be placed at that end of the boiler, in such a manner as to be acted upon by the waste heat which escapes into the flue. The patentee remarks, that when it is found more convenient to remove the cylinder and steam-heating apparatus from the neighbourhood of the furnace, he sometimes employs an additional fire or fires to heat these parts separately, unless the waste heat, arising from the furnace connected with the boiler, can be conveniently made use of.

The patentee claims, First,—the employment of a separate steam-heating apparatus, which contains no water, and into which apparatus steam, generated in the usual manner, is conveyed, and, from its exposure to the action of the fire, receives an increased temperature, exceeding that of the steam in the boiler; and, Secondly,—the application or employment of steam, so heated, to a cylinder or cylinders, also kept at a high temperature by exposure to the heat of a fire, whereby the temperature of the steam, operating in the cylinder, is maintained to a convenient degree.—[*Inrolled in the Petty Bag Office, January,* 1846.]

To John Ayre, *of the borough and parish of Tynemouth, in the county of Northumberland, sail-maker, for an improved fabric for sail-cloth.*—[Sealed 15th November, 1845.]

This invention consists in strengthening the woven fabrics or cloths of which sails are to be made, by introducing thick warp threads at intervals into the fabric; and in still further strengthening the fabric at those parts where reef points are to be attached, or where, for any other purpose, additional strength is required, by introducing thick weft threads.

In warping the threads of which a "bolt" of canvas or any other fabric intended for sail-cloth is to be made, the patentee introduces one or more sets of threads of a stronger and stouter quality than the threads commonly used for the warp; each set of strong threads occupying about two inches of the width of the warp, and being at equal distances from each other. The fabric is then woven in the ordinary manner, except that at those parts where it is desired to strengthen the fabric still further, a weft of stronger thread than the generality of the weft is used. A fabric is thus produced, which, when made up into a top-sail (for instance), presents the appearance exhibited by the drawing in Plate XIV., in which three sets of thick warp threads are shewn in each breadth of the fabric; the shaded parts marked A, representing those parts of the fabric where thick warp threads are used, and the shaded parts B, and C, those parts where thick weft threads are used.

The patentee claims, as his invention, "the strengthening of any fabric intended to be used for sail-cloth; by the introduction of occasional thick and strong warp and weft threads (either or both), as aforesaid, in the weaving of such fabric." —*Inrolled in the Rolls Chapel Office, April,* 1846.]

To EDMUND MORGAN, *of Tenby, in the county of Pembroke, Gent., for his invention of an improved envelope for letters.* —Sealed 9th October, 1845.]

THIS improvement consists in the production of a novel form or shape cut out of paper, and afterwards folded up; to constitute an envelope or receptacle for enclosing a note, letter, or small package, to be sealed and conveyed by post or otherwise.

This novel form is shewn in Plate XIII., at fig. 1, which represents the piece of paper cut to the desired shape; the dotted lines marking the parts and directions in which the folds are intended to be made, in order to double up the paper into the rectangular form shewn at figs. 2, and 3; the former representing the back of the envelope, with a seal in the middle; the latter the face of the envelope, on which the direction is to be written, and the post office stamp attached.

In cutting a sheet of paper into pieces or forms like that represented at fig. 1, the patentee observes, that various convenient means and apparatus may be resorted to; he does not, therefore, confine himself to any precise mode of cutting the paper.

The patentee prefers, however, to employ a tool of steel having a sharp edge, as shewn in plan and longitudinal section at figs. 4, and 5, for the purpose of cutting a great number of these envelopes, at one operation, from a pile of paper, that is, from a heap consisting of a great many sheets of paper piled one upon another. In using this instrument, its cutting edge is to be placed downward upon the pile of paper, which, with the cutting tool, is then to be put into or under a press, of any convenient construction, where, by the power of the press acting upon its back, the cutting tool will be forced through the pile of paper, so as to cause a great number of pieces of the desired shape to be cut out of the pile at one operation.

Having cut the pieces of paper into the shape described and shewn at fig. 1, each piece is then coated, on one side only, with gummy matter or cement, at the parts marked *a*, *b*, and *c*, *c*. The cement preferred to be used, is that commonly employed for the backs of postage stamps; but any other adhesive matter will answer the purpose, provided it dries quickly, and attaches the edge of the paper securely.

The form or piece of paper at fig. 1, having been thus prepared, the part *d*, is then folded, at the dotted line, down upon the part *e*, *e*; and, when this is done, the lateral flap parts *f*, and *g*, are likewise folded, at the dotted lines, upon the back of the part *d*, and by wetting the cement at *a*, and *b*, the flaps will be secured to the back of the envelope. By these means a letter-case, closed and secured on all sides, except at the end *h*, as at fig. 2, will be produced. This end *h*, is a flap to cover the opening left for the admission of the letter or other article to be enclosed in the envelope. As it may be considered desirable, more for the sake of appearance than security, to place a wax seal upon the back of the envelope, that may be done at any convenient time by the parties intending to use them, and the envelopes will then be kept thus apparently sealed; but, generally speaking, a fancy wafer, or adhesive medallion, in imitation of a seal, may be applied to the middle of the back of the envelope, over the junction of the flaps, as represented in fig. 2. The envelope is then ready for use at a moment's notice; and the letter or other matter being introduced at the opening in the end, and the cement *c*, being moistened, the flap *h*, is folded down upon the face of the letter, by which the contents of the envelope become sealed up securely, as shewn at fig. 3. A postage-stamp, if necessary, may be stuck on the right-hand top corner of the face of the envelope, which will nearly cover and hide the joint.

The patentee claims the form or shape in which the pieces of paper are cut out, in order to constitute folding flaps; also the way in which they are folded, and the edges of their flaps attached to the outer part of the paper, for the purpose of producing convenient and secure envelopes for letters.—[*Inrolled in the Petty Bag Office, April,* 1846.]

Specification drawn by Messrs. Newton and Son.

To OGLETHORPE WAKELIN BARRATT, *of Birmingham, experimental chemist, for certain improvements in the manufacture of acids, and in treating the noxious vapours or gases given off from chimneys, and from chemical and other works.*—[Sealed 10th February, 1845.]

THIS invention of certain improvements in the manufacture of acids, and in treating the noxious vapours or gases given off from chimneys, and from chemical and other works, relates, firstly, to the manufacture of sulphuric acid; secondly, to the manufacture of muriatic acid and sulphate of soda; thirdly, to a mode of treating the ammoniacal liquor of the gas-works, to prevent the escape of noxious vapours therefrom; and, fourthly, to a mode of treating the refuse lime and other products that remain in the lime-purifiers at the gas-works, in order to prevent the escape of noxious vapours therefrom.

The improvements in the manufacture of sulphuric acid consist in preventing the escape of the waste acid gases, which have hitherto been allowed to pass into the atmosphere, and cause serious injury to property and animal and vegetable life, where such chemical processes are carried on; which gases, by the improved process, are made available for the manufacture of a further quantity of sulphuric acid, and also for the production of a salt of ammonia.

The figure in Plate XIV., represents a vertical section of a series of sulphuric acid chambers, with the furnace for burning the sulphur, and with apparatus applied thereto for carrying out this part of the invention. A, is a small furnace, on the floor of which sulphur is burned; on this floor is a tripod-stand, supporting an iron capsule, which contains the materials for making nitric acid, namely, dilute sulphuric acid and nitrate of potash or nitrate of soda; and instead of passing steam into the sulphuric acid chamber, the sulphuric acid is diluted from 1.400 to 1.500 sp. gr. From the furnace A, a pipe leads into the sulphuric acid chamber B, and this chamber communicates with other similar chambers C, and D. The chambers B, C, D, are charged with water to about a foot deep; the heat of the burning sulphur evolves the nitric acid fumes; the sulphurous acid becomes mixed with nitric acid vapour, which it carries with it into the chambers B, C, D, and through the trough E; and the acid gases that escape condensation, instead of being allowed to pass through the ordinary waste-pipe into the air, are passed through the pipe F, direct into the air-pipe G, at G*, and, after mingling with the air in the air-pipe, will be carried forward with the air into the furnace containing the burning sulphur. But, when the sulphuric acid chambers are not of sufficient area for the condensation of the gases, in order to increase the time the gases take in passing round, and for more effectually condensing the acid gases, one or more vessels or chambers are charged with ammoniacal liquor of the gas-works, or with water only; and instead of passing the return gases from the trough E, down the pipe F, direct to the air-pipe G, at G*, they are passed through the vessel or vessels, and then returned through a suitable pipe to the air-pipe G, at G*. When more than one vessel is used, the gases are conducted from one to the other by pipes, in a similar manner to the sulphuric acid chambers. Or the time for the gases passing round may be increased by different arrangements of the pipes, both in the sulphuric acid chambers and in the vessels just mentioned, by causing the pipe which takes the gas out of the chamber or vessel to dip near the surface of the liquor, in the manner indicated by the dotted lines at H, in the last sulphuric acid chamber, or by increasing the number of vessels. The vessels for containing the ammoniacal liquor or water are provided with stop-cocks, and when they are charged with the water, and the water in the first one is saturated with acid gas, it is drawn into the first sulphuric acid chamber; the liquor from the second vessel is then passed into the first; that in the third vessel is passed into the second; and so on, according to the number of vessels employed; and the last vessel is re-charged with water. When the vessels are charged with ammoniacal liquor, and the liquor in the first vessel has become saturated, as can be ascertained by the usual tests, it is drawn off into pans for evaporation and crystallization in the usual way; and the liquor in the second vessel is then drawn into the first, and so on, as when water is used; and the last vessel is re-charged with fresh ammoniacal liquor.

The patentee next describes the mode of rectifying or concentrating the sulphuric acid, as ordinarily practised at most of the chemical works where sulphuric acid is made, and afterwards his improvements on the same. The weak acid drawn off from the sulphuric acid chamber is concentrated by evaporation in open leaden vessels, and is afterwards placed in retorts for final concentration. The beaks of the retorts are passed through apertures into a trough that contains water, as is well understood; the acid gases that escape condensation in the trough are passed into a shaft or chimney, and allowed to escape into the atmosphere.

Under the improved plan, instead of allowing the acid gas to escape from the trough, a pipe is attached to the trough, and connected with the air-pipe G, at G*, where the acid gases are allowed to mingle with the air in the air-pipe, and are then conveyed over the burning sulphur in the furnace into the sulphuric acid chamber, which saves a corresponding quantity of nitrate of potash in the nitre-pot; or the pipe leading from the trough may dip into a vessel containing ammoniacal liquor, or the ammoniacal liquor may be placed in the trough, and there condense the acid gases.

The improvement relating to the manufacture of muriatic acid and sulphate of soda, consists in the use of the ammoniacal liquor of the gas works for condensing the muriatic acid gas. In the manufacture of muriatic acid, where Woulfe's or other similar apparatus are used, the patentee employs a vessel or vessels of sufficient capacity for containing the ammoniacal liquor, and connects them by a pipe to the last of the series, to convey the acid gas (which is usually discharged into the atmosphere) to the vessels containing the ammoniacal liquor. This pipe should dip into the liquor, which it will be found convenient to stir from time to time; and near the opening which is usually left to cause a draft, where such processes are carried on, an open vessel containing ammoniacal liquor is placed, to attract the muriatic acid gas, instead of allowing it to escape through the opening into the air.

For the condensation of muriatic acid in the manufacture of sulphate of soda, one or more vessels are charged with the ammoniacal liquor, and connected by pipes to any convenient part of the chimney from which the muriatic acid gas is given off, or to the furnace in which the chloride of sodium is decomposed; and after the condensation of the acid gas is effected, and the ammoniacal liquor becomes saturated, it is drawn off, the vessels are re-charged, and the saturated liquor is evaporated in the usual way of manufacture. Although the ammoniacal liquor of the gas works only is named, other solutions or salts of ammonia may be used, or the salts of ammonia obtained may be decomposed and used over again for an indefinite period; or the muriate of ammonia obtained above may be decomposed with lime, and the gas passed into a chamber or gas-holder, and the waste muriatic acid gas liberated in the above manufacture may be conveyed into the chamber or gas holder, where the gases will be condensed and form muriate of ammonia. The patentee does not claim the uniting of muriatic acid with ammonia, nor the decomposition of muriate of ammonia with lime. But he claims the use of ammoniacal liquor or ammonia for the condensation of the muriatic acid gas given off during the manufacture of muriatic acid and sulphate of soda.

The third part of the invention consists in a mode of treating the ammoniacal liquor of the gas works, which is an impure carbonate of ammonia. It is usual to run it into the sewers or rivers, whence a large quantity of noxious vapours are evolved, or to sell it to the manufacturing chemists for manufacturing the different salts of ammonia. By the improved process the escape of noxious vapours is entirely prevented by the whole being absorbed. The apparatus employed for this purpose consists of a furnace, as at A, in the figure before referred to, with an air-pipe similar to G, and of three or more vessels, communicating with each other by pipes, in a similar manner to the sulphuric acid chambers shewn in the drawing; the chimney leading from the furnace enters into the first vessel; and a pipe is carried from the last vessel of the series into the air-pipe G, at G*. The vessels are charged with ammoniacal liquor; the furnace is charged with sulphur; and the usual quantity of nitrate of potash and sulphuric acid for furnishing nitric acid is put into an iron capsule or nitre-pot, and placed on an iron tripod-stand in the furnace, in the usual way. The sulphur is lighted in the furnace, when the gas will pass through the apparatus and return through the air-pipe to the furnace. When the liquor in the first vessel is saturated (which can be ascertained by the usual tests), it is drawn off into the pans for evaporation; the liquor in the second vessel is run into the first, the liquor in the third vessel is run into the second, and the third vessel is then re-charged with fresh liquor. Or, instead of using the above-named vessels, the acid gases leaving the furnace A, with its air-pipe, may be conducted by a pipe from the chimney direct into the pits or receptacle employed at gas works for holding the ammoniacal liquor, and then brought from such pits by a pipe into the air-pipe G, at G*, and thence to the furnace. When the liquor in the pit is saturated, the acid gas is to be stopped off, and conducted by a pipe into another pit, containing fresh liquor; the saturated solution must then be pumped out of the first pit for evaporation, and crystallized as sulphate of ammonia in the usual way, or may be sold in a liquid state as manure. Sometimes, instead of using sulphurous acid gas, the ammoniacal liquor is treated with muriatic acid gas, and in nearly the same way as in the preceding process; but, instead of having the furnace, with its air-pipe and return-pipe, the patentee employs the ordinary furnace, which is already in use for the decomposition of chloride of sodium, in the manufacture of sulphate of soda, and passes the muriatic acid gas by a pipe direct from the furnace to the pit or vessel, as the case may be. When the liquor is saturated it is drawn off, and finished in the usual way of manufacture; the vessels are re-charged with fresh liquor, and the process continues as before.

The last part of the invention consists in treating the refuse lime and other products that remain in the lime purifiers at the gas-works, after it is saturated or no longer fit for the purification of gas, by passing acid gases through the purifiers and thereby fixing those volatile combinations of ammonia, and preventing that offensive stench from the noxious vapours given off on opening the purifiers for the removal of the products, and rendering the refuse lime which will then contain the fixed salts of ammonia, doubly valuable for agricultural purposes. The mode of proceeding is the same as for treating the ammoniacal liquor:—After the hydrogen gas is shut off from the purifiers, the pipe of the furnace A, is connected with the purifier, and when the acid gas has circulated through the purifier, it is passed out in an opposite direction by the pipe F, into the air-pipe G, at G*, and into the furnace A. When the contents of the purifiers are saturated with the sulphurous or sulphuric acid, the charging of the furnace with sulphur and the products for furnishing the acid is stopped. After a sufficient time is given for the absorption of the gases contained in the purifiers or other vessels, the charge can be withdrawn.

The patentee claims, Firstly,—the means, above described, of condensing the whole of the waste gases evolved in the manufacture of sulphuric acid. Secondly,—the means, above described, of condensing the acid gases evolved during the rectifying of sulphuric acid. Thirdly,—the means, above described, of condensing the muriatic acid gas evolved during the manufacture of muriatic acid and sulphate of soda. Fourthly,—the means, above described, of treating the ammoniacal liquor of the gas-works with the acid gases. And Lastly,—the means described of preventing the escape of noxious vapours from the lime which has been used for purifying coal gas.—[*Inrolled in the Petty Bag Office, August,* 1845.]

To THOMAS LAWES, *of Old Kent-road, in the county of Surrey, Gent., for improvements in propelling carriages on rail and other roads, and boats or vessels on canals or rivers; which improvements are also applicable to machinery in general.*—[Sealed 3rd June, 1845.]

THIS invention consists in certain modifications of the known modes of obtaining propelling power from pneumatic pressure, and, in the first place, applying the same to the traction of carriages on what are commonly denominated atmospheric railways; secondly, in adapting the same tractive power to the towing of vessels on canals and rivers; and thirdly, in employing similar contrivances for various other mechanical uses.

The improved mode by which pneumatic pressure is applied to the traction of carriages on railways will be understood by reference to the figures in Plate XIII.; in which fig. 1, is a section, taken vertically, of a portion of the tube of an atmospheric railway; the rail and one of the railway carriages being shewn above. Fig. 2, is a plan, representing the manner in which a series of tubes are intended to be laid; each tube shewn broken off in the middle, being supposed to be of great length, say a mile or two, or even more, in extent. Fig. 3, represents a front view of the carriage, with a transverse section of the railway, and of the pneumatic tubes below.

a, a, a, is the rail, upon which the wheels of the carriages run; *b, b,* is the tube below; *c,* a piston, working in the tube *b,* to which piston a chain or rope *d,* is attached. This chain or rope from the piston is carried under and over a guide-pulley *e,* stationed at the open end of the tube; and which chain or rope thence proceeds over guide-pulleys *f, f, f,* situate at convenient distances apart between the lines of rails *a, a,* and the extreme end of the rope or chain is made fast to the front of the carriage, as at *g.* Now, presuming the tube *b, b,* shewn in section in fig. 1, to be considered as a portion of a very long tube, say of a mile or two in extent, the end at *e,* being open and the opposite end closed, and the carriage on the rail above, and track-rope as described, by the ordinary and well-known means a vacuum is to be produced between the closed end of the tube and the piston *c,* when the pressure of the atmospheric air, passing in at the open end of the tube, will cause the piston to proceed with great rapidity along the tube, following the vacuum until it reaches the closed end of the tube, and the piston, by so moving through the length of the tube, will cause the carriage to be drawn by the rope or chain *d,* along the rail above, from one end of the tube to the other end, in an opposite direction to the progress of the piston. The carriage having arrived at the end of the first tube, it is to be released from the track-chain or rope by any of the ordinary means, and the rope or chain of the next tube being ready, the carriage is to be immediately made fast to the rope or chain of the second tube, when, by similar means, it will be drawn onward to the third tube, and so on, until the carriage, by a repetition of the operations described, will be brought to its destination at the end of the line.

In fig. 2, the series of tubes are shewn as placed alternately on different sides of a right line, but parallel to each other: this, however, is not absolutely necessary, as the centres of the tubes might be coincident; the guide-wheel *e,* being placed at the open end of each tube, which is the mode contemplated with reference to the above operation, in which the track-chain is carried over a guide-wheel. But, in some cases, the patentee proposes to dispense with the guide-wheel *e*, and carry out the track-chain in a straight line from the back of the piston, and connect the outer extremity of the track-chain or rope to the front of the carriage. This plan the patentee prefers for a straight line; but he observes, that the open part of the tubes are to be at the reverse end to that described at *e*, in fig. 1; that is, the end of the tubes in fig. 2, must be open at *h*, *h*, *h*, and the carriage must be attached to the rope or chain (shewn by dots) at *i*. For this mode of applying pneumatic traction, the series of tubes is placed as shewn at fig. 2; but for the former, in which the track-chain or rope is carried back over a guide-pulley, the tubes should be coincident.

When it is desired to track carriages upon a curved line of rails, as shewn in the plan A, A, A, fig. 4, (the pneumatic tubes, as they must necessarily be made straight, will not then lie parallel with the railway), the patentee places the pneumatic tube at any convenient angle to the line of the railway, as seen at B, B. The tube, in this instance, must be closed at the end *z*, and a guide-wheel *y*, placed at its open end; the track-chain *x*, *x*, *x*, extending from the piston within the tube, in the way above described, must pass round the guide-wheel *y*, and be connected at its reverse end to the carriage *w*, when, by the progress of the piston in the tube from *y*, to *z*, effected by a vacuum in the known way, the carriage *w*, will, by the chain or rope *x*, be drawn along the curved railway up to the point *y*.

In towing vessels on curved rivers or canals, this plan of an oblique pneumatic tube may be resorted to with great advantage, as the tube from which the tractive power is to be obtained may be placed in a straight line, out of the way of the towing path, or any other obstruction, and will, by the means described, communicate the tractive power by which vessels may be towed on the river, or canal, without the aid of horses, or of paddles, attached to the vessels.

This mode of obtaining mechanical power, by the passage of a piston through a long tube exhausted of air, may be applied for raising heavy bodies, as materials from mines, and a great variety of other uses.

In order to return the piston in the tube ready for a second stroke, as one end of the tube is always open, it will be necessary to conduct the piston toward the orifice of the tube by any convenient means; this the patentee proposes to do by connecting the track-rope to a carriage, moving on a parallel line of pneumatic tubes and rails, constructed for the conveyance of carriages in the opposite direction, as the means described at figs. 1, and 2, are intended to produce continued traction in one way only.—[*Inrolled in the Petty Bag Office, December,* 1845.]

Specification drawn by Messrs. Newton and Son.

To John Reed Hill, *of* 28, *Upper Stamford-street, Lambeth, in the county of Surrey, civil engineer, for certain improvements in atmospheric propulsion, applicable to water as well as land carriages,—being a communication.* —[Sealed 2nd October, 1845.]

These improvements in atmospheric propulsion consist, firstly, in a mode of constructing pneumatic mains, and carriages and pistons to be used therewith; secondly, in removing the air through the pistons or piston-carriages of pneumatic mains; thirdly, in a method of giving motion to carriages without the aid of a pneumatic main; fourthly, in propelling passage boats or other vessels on water, by placing the improved mains on the banks of canals, &c., and establishing a communication between them and the boats or vessels.

In Plate XIV., fig. 1, represents a transverse section of the main when closed, containing the piston-carriage *c,* with its air-tubes *f, f,* for the removal of the air from the main by any known means of exhaustion (the apparatus for that purpose being attached to the piston-carriage); *g, g,* the valves or roof of the main, to be lined at the points where they close with soft leather, cloth, or other elastic material, attached to thin boards or other flexible materials, and covered with a flexible cap; *a, a,* wood paving, with iron edge-rails between the blocks, level with the surface. Fig. 2, is a transverse section, shewing the main when open and carriages passing through it; *b, b,* are dwarf-walls; *c, c,* concrete foundations or ballast; *d, d,* planking or sleepers; *e, e,* wall-plates and hinges; and *h, h,* steps for ascending to the roof of the carriage. Fig. 3, is a longitudinal section of the main, and fig. 4, a ground plan. *i,* is the bar that connects the piston-carriage with the first carriage of the train; but, if preferred, a train of carriages for heavy goods may be continued from the piston to the passenger-carriage, instead of employing a long connecting-bar.

The figures above referred to represent the main as being of sufficient width to admit of trains moving inside; each carriage being provided with rollers for throwing open the valves. But when the main is not of sufficient size for that purpose, a carriage should move inside at a certain distance behind the piston, in order to throw open the valves by means of horizontal wheels or rollers attached to the upper part of the sides of the carriage; which carriage should also serve to connect the trains to the piston when moving outside, or to connect the piston with barges or other vessels on the water, when the main is laid on the bank of a canal. The valves are to be composed of a series of wooden or metallic rafters, attached by hinges to wall-plates, bedded on the top of dwarf-walls; which rafters are to be covered inside and outside with boards, asphalted felt, sheet-iron, or other flexible material, rendered impervious to air and water, and of sufficient strength to resist the atmospheric pressure; a covering of India-rubber or other impervious material should likewise extend to the dwarf-walls, in order to render the joints air-tight. A communication is intended to be made between the roof of each carriage and the interior, by means of stairs or a step-ladder, to enable passengers to ascend or descend, as from the deck of a ship to the cabin.

The inventor likewise proposes to convey goods and passengers, by means of pistons, mounted on wheels, as shewn, and propelled by atmospheric pressure, through close tunnels or galleries, constructed somewhat similar to the main above described, but with arched roofs, and the side walls of greater elevation, in order to afford sufficient carriage-room; such tunnels or galleries may be illuminated by artificial light, when necessary, or by daylight through strong glass or other transparent media, and are provided with doors in the sides for the admission of passengers, opening outwards, and so constructed as to exclude the external air and resist the atmospheric pressure. The air is to be removed from the mains through cylinders or other channels, by any known methods; the apparatus for that purpose being attached to the piston-carriage, or the next following carriage, so as to be independent of stationary power, as occasion may require.

The inventor also proposes " to put carriages in motion by means of rapid currents of air, thus driven through cylinders, traversing such carriages from front to rear, without the aid of a pneumatic main (the apparatus for such purpose being placed in such carriages); and the velocity with which such carriages can be moved will be in proportion to the amount of power applied to the area of the cylinders, and the rapidity with which the air is propelled through such cylinders or other channels, which should traverse these carriages from front to rear; and these carriages may be guided by rails and flanged wheels, or by dwarf walls, with horizontal wheels or rollers attached to the lower parts of the carriages, as shewn in the drawings."

The patentee claims, Firstly,—the mode, above described, of constructing pneumatic mains for the conveyance of goods and passengers by atmospheric propulsion, combined with the description of carriages and pistons above mentioned, with such modifications as may be required for internal and external propulsion. Secondly,—the removal of the air through the piston or piston-carriages of the mains above described, and also through the pistons of metallic cylinders, as now used, by means of tubes communicating with the external carriages through the openings of the longitudinal valve. Thirdly,—giving motion to carriages in the manner described without the aid of a pneumatic main. Fourthly,—the mode of applying this power to the propulsion of passage-boats or other vessels on water, by placing the mains, above described, on the banks of canals, &c.—[*Inrolled in the Rolls Chapel Office, April,* 1846.]

To JAMES POLKINGHORNE, *the younger, of Hoxton, in the county of Middlesex, Gent., for improvements in treating ores, and in separating from them the metals which they contain.*—[Sealed 18th September, 1845.]

THIS invention consists in the following mode of treating tin ores:—The ore is first pulverized, washed, and calcined; from the calcining furnace the ore is taken while yet hot, and thrown into cold water, in which it is allowed to remain for a few minutes; it is then taken out, and cleansed by repeated washings; after which it is made into a paste, by mixing it with a saline solution, composed of fourteen parts, by weight, of common salt, five parts of muriatic acid, and five parts of a solution of sulphate of iron; about ten gallons of this solution will generally be sufficient for a ton of ore. The paste is left to work for a period varying from three to seven days, according to the quantity of foreign matters contained in the ore; it is then broken up, agitated, and washed in the "tossing machine" represented in Plate XV. Fig. 1, is a vertical section of the machine, and fig. 2, a horizontal section, taken in the line 1, 2, of fig. 1. *a*, is a cistern, filled with water to the line *z*, *z*; $a*$, a tap, through which the water is withdrawn from time to time; *b*, a vertical shaft, which turns in a socket in the bottom of the cistern, and carries four radial blades *c*, *c*; *d*, a horizontal shaft, turning in bearings *e*, *e*, and furnished with a fly-wheel *f*, and with a bevil-wheel *g*, which gears into a bevil-pinion *h*, fixed on the top of the shaft *b*: thus, on motion being given to the shaft *d*, by turning the handle *i*, the shaft *b*, will be caused to rotate. The foreign matters mixed with the tin are mostly dissolved in the water, and carried off along with it, while the tin falls, in a highly purified state, to the bottom of the cistern. When the tin is removed from the tossing machine, it is mixed with a flux, composed of soda-ash and culm, in the proportion of about 2 cwt. of the soda-ash, and from 4 to 7 cwt. of the culm to every ton of the ore; after which the smelting is performed in the ordinary manner.

The patentee claims, Firstly,—the general system of treating tin ores, in the combined series of processes of which the same consists, as above described. Secondly,—the method of immersing the ore, as it comes hot from the calcining furnace, in cold water, as above described; whether employed as part of the said general system, or of any other system or method of treating such ores. Thirdly,—the use of the saline solution, above described, to facilitate the separation of the tin from the foreign matters with which it is intermixed; whether employed as part of the said general system, or of any other system or method of treating tin ores. Fourthly,—the use of a combination of soda-ash and culm as a flux in the smelting of tin ores. Fifthly,—the employment of the improved tossing-machine, above described, in the treating of tin ores.—[*Inrolled in the Inrolment Office, March,* 1846.]

To WILLIAM HENRY WALLER, *of Vauxhall Water Works, Upper Kennington-lane, Lambeth, in the county of Surrey, engineer, for improvements in sluice-cocks.*—[Sealed 31st October, 1845.]

THE patentee commences his specification by pointing out the defects of the sluice-cocks now generally employed, which are liable to leak, and quickly become injured by use. His invention consists in applying moveable bushes or facings to sluice-cocks, and in constructing the bushes in such a manner that they shall be harder, and fit more truly, and may be more readily applied, and replaced when worn; it further consists in a mode of rendering the working surfaces of sluice-cocks, which are made without moveable bushes, more hard and durable.

In Plate XV., fig. 1, is a vertical section of the improved sluice-cock; fig. 2, also represents a vertical section, taken on the line A, B, of fig. 1; and fig. 3, is a horizontal section, taken on the line C, D, of figs. 1, and 2. *a*, is the body of the cock; and *b, b,* are portions of two pipes, which enter the sockets of the cock, and are retained therein water-tight by the application of melted lead, in the usual manner. The body of the cock is bored out at the points 1, 2, 3, and the backs of the bushes *c, c,* are turned in a lathe, so as to fit the recesses thus formed. The bushes are made, by preference, of cast-iron (although other metal may be used); the working surfaces 4, 4, are chilled in the act of casting, and are ground or "faced up" with emery in a lathe. The bushes are coated on their backs with marine glue, or similar material, previous to introducing them into the cock; and after the bushes have been introduced into the cock, they are moved back in the recesses before mentioned, into a proper working position, by forcing down the plug *d,* into its place. The patentee does not confine himself to the shape of the recesses formed in the body of the cock, as that may be varied. *e,* is a screw for raising and lowering the plug; *f,* is a screw-nut, fitted into a recess at the top of the plug; *g, g,* are ribs, formed on the interior of the upper part of the cock; and *h, h,* are corresponding ribs on the outer surface of the upper part of the plug; the use of the ribs being to guide the plug correctly in its movement up and down. The surfaces 5, 5, of the plug, are chilled in the act of casting, and are then ground with emery.

When making sluice-cocks without moveable bushes, the patentee causes the surface against which the plug works to be chilled in the act of casting the body of the cock, so as to make it more durable; and this surface is afterwards rendered true by means of a revolving tool and emery.

The patentee claims, Firstly,—the mode of preparing the bodies of sluice-cocks with recesses for receiving bushes; the planes of the surfaces 1, 2, 3, being inclined to the central line of the barrel of the cock, as above described. Secondly,—the mode of applying moveable bushes to cocks. Thirdly,—making the moveable bushes, and also the plugs of sluice-cocks, with chilled working surfaces, as described. Fourthly, —the making of sluice-cocks with chilled surfaces, which form the bed of the plug.—[*Inrolled in the Inrolment Office, April,* 1846.]

To **Frederick Rosenborg,** *of Kingston-upon-Hull, in the county of York, Gent., for improvements in the arrangement or construction of machinery or apparatus for propelling or impelling vessels, and in steering or manœuvring the same.*—[Sealed 12th June, 1845.]

This invention relates, in the first place, to an improved mode of constructing stern-propellers, whereby a more efficient propelling power and greater strength is obtained than by any of the modes hitherto adopted. The improved stern-propeller is constructed in the form of a wheel, the parts of which are made of wrought-iron, and is furnished with inclined blades, mounted in such a manner as to give the greatest amount of propelling power, and least possible drag or friction. Although (as will be seen upon inspecting the drawing, Plate XIV.) the blades of the propeller are inclined or placed obliquely, the curve that is given to them does not form any portion of a screw, but forms a curve or inclination of a totally different character, as will be best seen in the diagram, fig. 2, which represents the blades as connected at one end to the centre shaft, and at the other to the exterior rings or peripheries of the wheel. By an examination of this figure it will be seen, that the curve or angle throughout the whole of the blade is different at every point, and increases gradually as the distance from the centre shaft is increased. The mode of generating this curve will be clearly understood by the following description, reference being had to fig. 3:—The blades consist, in the first instance, of flat plates of sheet-iron, of the form shewn at A, fig. 3; and when the wrought-iron arms *a, a,* to which the blades are affixed, are fastened into the main shaft *b,* one side of the plate which is intended to form a blade is firmly secured, either by bolts, or in any other suitable manner, to one of the radial arms (as shewn by dots at 1, 2, in fig. 3.), and the other side of the plate is then drawn forward, and firmly secured to another radial arm belonging to the opposite ring, as shewn at 3, 4, and in advance of its fellow arm on the opposite side, thereby giving the plate the twist or curve shewn in the drawing at fig. 3. The plates of sheet-iron, which form the blades, are shaped into the requisite curves by hammering, so that, when they are applied to the wheel, they will be found to fit exactly in their proper places. At fig. 2, it will be seen that the edge of the lower end of the blade is parallel to the main shaft, whereas the top edge is at about an angle of 30° to the main shaft: this gives the peculiar twist or curve shewn in figs. 1, and 3, and which has been found to act in an exceedingly satisfactory manner. The patentee does not, however, confine himself rigidly to the angle above mentioned.

One of the principal objections to the ordinary stern screw-propellers is, that the blades are mounted at the end of radial arms, like to the blade of an oar, and, in order to give sufficient strength and solidity to the propeller, these radial arms are obliged to be made stout and thick near the shaft; the consequence of which is, that the lower part of the radial arm, or that nearest the shaft, injuriously affects or counteracts the impelling power of the propeller, which is also always liable to be broken off short by heavy seas; or the propeller may be rendered totally useless by ropes or weeds getting twined round the arms and shaft. To remedy these and other inconveniences to which this description of propeller is liable, the inventor has, in his propeller, disconnected the blades from the main or centre shaft, and removed them a proper distance therefrom, so as to admit of a free and undisturbed flow of the dead water round the said shaft. The radial arms which carry the side exterior rings, and to which the propelling blades are connected, are constructed of as thin metal as is consistent with strength and safety; and these arms are placed so as to present their edge obliquely to the water, and thus act, in some degree, as propelling blades. The blades being firmly secured, as before stated, to these radial arms, instead of direct to the shaft, as is generally the case with stern propellers, a clear open space is left all round the main shaft, as shewn in figs. 1, and 3, so that, without any, or at any rate very little, counteraction, the propelling blades are allowed to exert their full power against the water.

. One great advantage arising from constructing the radial arms of forged iron, and thereby presenting but little useless resistance to the water, is, a considerable reduction of the friction which is incidental to, and inseparable from, the ordinary construction of stern propellers. In order to secure the radial arms and the blades that are affixed to them in their proper position, the radial arms are bolted to the external rings *c, c,* which are also connected together by cross-pieces *d, d,* whereby a very strong, firm, light, and effective propeller is produced, not liable to the inconveniences which so seriously interfere with the effective operation of the ordinary stern propellers. This improved propeller may be placed either in the dead wood, and before the rudder, as is generally the case with stern propellers; or it may be placed behind the rudder, as seen in the plan and sectional views of a vessel, shewn at figs. 5, and 6. The patentee remarks that, although the propeller is represented as consisting of only three blades, he does not intend to confine himself to that number; but he has shewn three, as that number has been found to answer the purpose.

The second part of the invention relates to a novel mode of steering and manœuvring vessels, and consists in the employment of tubes or pipes, through which water is drawn in from the bottom, and forced out at the sides of vessels, by means of suitable pumps and apparatus, for the purpose of turning the head of the vessel round with greater facility. The arrangement of apparatus employed to effect this object is shewn at figs. 4, 5, and 6. The pipes or water-ways, through which the water is forced out at the sides by the pumps, as before mentioned, are placed across the vessel at the head and stern, as shewn at A, and B. These pipes are furnished with stop-cocks and valves, for the purpose of changing the direction of the water, and communicate with a reservoir or cistern, situated over the keel, and midway between the sides of the boat. Upon this cistern or reservoir one or more pumps are mounted; and when these pumps are set to work, they will draw in water through the bottom of the vessel, and force it out through one of the side pipes; by which means the vessel is made to turn round on its centre, as shewn by the large arrow at the bows and stern of the vessel, in fig. 5. The water being admitted to the cistern or reservoir through the bottom of the vessel, as before mentioned, the cock on one of the cross pipes must be opened, for the purpose of allowing the water to flow out. The cocks which control the exit of the water are worked simultaneously by rods and levers, which are moved by hand-levers, placed on deck near the main-mast, or the wheel, or any other convenient situation. The cocks belonging to the apparatus at both ends of the vessel, that is, at the bows and stern, should be connected together by rods, so that they may move simultaneously when it is required to turn the vessel round on its centre; but this connection must be so arranged as to be easily disconnected when it is required to turn the vessel on a point, either near the bows or the stern; as, in such a case, only one of the apparatus must be employed;—that is, if it is required to turn the head of the vessel round, without moving the stern, the apparatus at the bows only must be brought into play; whereas, if the stern is required to be brought round, the apparatus at this end must be put in action, and that at the bows stopped. It will, of course, be understood that the head or stern of the vessel is moved round in precisely the opposite direction to that at which the water is forced out, as shewn by the large arrow at the bow and stern of the vessel in the figure; and also that, by means of this apparatus, a vessel may be turned round on any point, without the necessity of any onward or progressive motion being communicated to her by the propeller. The advantage of being enabled to execute this manœuvre with facility in a naval engagement, or in any other situation of danger, must be evident to every nautical man. In order to keep the rudder out of the reach of danger, it is placed in the dead wood of the vessel, and below the water-line, as seen at c, in fig. 6. The rudder is worked by a tiller or wheel, in precisely the same manner as ordinary rudders, but being below the water-line cannot very easily be damaged by shot. The pumps, for forcing out the water, are shewn at *e*, *e*, and the cistern or reservoir at *f*, *f*. These cisterns or reservoirs are supplied with water from the bottom of the vessel, by means of the short pipes *g*, *g*, fig. 4. Above the cistern are two other short pipes *j*, *j*, which are furnished with a conical valve *k*, that admits the water with facility into the cylinders of the pumps, when the pistons are raised, but prevent its egress, except through the lateral pipes *h, h,* which are furnished with valves opening outwards. Each of these lateral pipes is furnished with a cock, by turning which the direction of the water is regulated. These cocks may be connected together by rods, so that, when the apparatus is in operation, both will never be open at the same time; but when one is closed, the other will be open, and *vice versâ.* This, however, is not absolutely necessary. The pumps may be worked either by hand or by being connected to the engines, if in a steam-vessel; they may also be arranged in such a manner as to be made to pump the hold dry when required, by merely placing cocks on the short pipes *j, j,* and opening a communication from the hold or well of the vessel to the barrels of the pumps, by means of suitable pipes.

The patentee claims, First,—constructing stern propellers in the manner above shewn and described; that is to say, with blades formed with a curve generated in the manner shewn in the drawing; he also claims this curve as applied to the wheel in the manner shewn, or in any similar manner; and also the peculiar construction and arrangement of the various parts of the propeller. And, Secondly,—manœuvring vessels by means of water forced out by pumps through apertures made in the sides of vessels, as above described, whereby vessels may be moved round on certain points without any onward motion being communicated to them from the propeller.—[*Inrolled in the Petty Bag Office, December,* 1845.]

Specification drawn by Messrs. Newton and Son.

To Richard Atha, *of Walton, near Wakefield, in the county of York, engineer, for improvements in atmospheric engines.*— [Sealed 4th November, 1845.]

The arrangement of apparatus described under the above title consists of four or more sails, fixed upon "a stationed supporter," and driven or moved by the power of the wind; two force-pumps are attached to the shaft or fulcrum of the sails, for the purpose of forcing air into a cast-iron box or boxes, termed the main receiver or receivers; each receiver is provided with a safety-valve, to prevent an explosion occurring from the air being too much compressed, and also with a pipe, furnished with a stop-cock; the outer end of the pipe is suitably formed for being attached to another receiver, called a minor receiver, which is fixed upon the frame of a locomotive engine, and connected by a pipe with the working cylinders of the same: the engine is constructed in the same manner as the locomotive engines worked by steam. When the pipe from the main receiver is connected to the minor receiver, the stop-cock is opened, and the air rushes from the former into the latter, which thus becomes filled with compressed air; the stop-cock is then closed, and the pipe released; and the communication between the minor receiver and the cylinders being opened, the engine is put in motion. [*Inrolled in the Inrolment Office, May,* 1846.]

To John Henry Rehé, *of Moscow-road, in the county of Middlesex, surgeon, for improvements in the manufacture of starch and farinaceous food.*—[Sealed 22nd October, 1844.]

The first part of this invention consists chiefly in extracting, by pressure, from starch, or farinaceous substances largely composed of starch, any water which has been used in grinding, purifying, or preparing the same, whereby the process of drying is accelerated, and any tendency to fermentation is prevented. This may be effected, firstly, by atmospheric pressure, obtained by exhausting the air from beneath a strainer, on which the mixture of starch or starchy matter is placed; secondly, by forcing air into an air-tight receptacle, which has a strainer fixed at its lower end—the mixture, in this case, is introduced before closing the vessel; thirdly, by forcing the liquid, containing the starch or starchy matter, into a closed vessel, lined with a strainer, and in which vessel numerous perforations are made for the escape of the water; fourthly, by the aid of mechanical pressure, produced by the action of a weight, wedge, wheel, screw, or lever, or hydraulic or other means, applied so as to press upon the surface of the mixture, and drive out the water.

The patentee generally subjects the mixture to atmospheric pressure first, and then to mechanical pressure. The compact mass, thus produced, is subdivided into small angular portions, about three-eighths of an inch in breadth; and these are dried by placing them upon trays, over which a current of air, heated to 120° or 130° Fahr., or even more, is impelled.

The patentee claims, under this part of his invention, Firstly,—the forcible expression of water, when combined with starch or certain starchy matter. Secondly,—the subdivision of starch and other starchy matter (however derived or operated upon) into small angular segments or fractured portions, previous to drying. Thirdly,—the propulsion of heated air over starch and other starchy matter, for the purpose of drying the same.

The second part of this invention consists in manufacturing starch from unground rice, by exposing it first to a high temperature, and subsequently macerating it in a solution of caustic alkali. 1 cwt. of rice is spread over a surface to the depth of one inch, and exposed to a temperature varying from 160° to 180° Fahr., for two or three hours; after which it is put into a vessel containing water, and agitated for five minutes; the water is then drawn off, and the rice is introduced into a caustic alkaline solution, composed of 4 lbs. of pure soda to 70 gallons of water,—potash may be used instead of soda; but the latter is preferred. The rice remains in the solution for five days (being stirred two or three times a day); the liquid is then drawn off, and the rice ground with water to the consistence of cream, and allowed to rest for twenty-four hours; at the expiration of which period the mixture is skimmed, and the clear liquid drawn off by a syphon. 224 gallons of water are now mixed with the rice, and the mixture is allowed to rest for thirty minutes; by this time the grosser and azotic portions will have subsided, and the upper or fluid part of the mixture, which contains a large quantity of starch, is removed by a syphon into a suitable vessel. The process of adding water, and drawing off through a syphon, is repeated until all the starch is drawn off; and when the starch has subsided in the vessel into which it has been removed, the water is allowed to run off; and it is finished in the usual way, or by the means described under the first improvement.

The patentee does not confine himself to the above mode of operating, nor does he claim the use of caustic alkali; but he claims the treatment of unground rice at an increased temperature, previous to macerating the same in a caustic alkaline solution.

The third part of this invention consists in manufacturing gum starch, sometimes called "dextrine" or "amidine," by macerating unground rice in an acidulous solution, at an increased temperature, and afterwards treating it with a caustic alkaline solution. 1 cwt. of unground rice is introduced into a solution, composed of 56 fluid ounces of sulphuric acid, sp. gr. 1.84, and 28 gallons of water,—nitric, hydrochloric, or oxalic acid, may be used instead of sulphuric acid; this solution is maintained at a heat of 185° Fahr., and is kept well stirred until the starch, forming part of the rice, is converted into gum-starch, which will be in about three hours; the acid liquor is then drawn off from the macerated rice, and the latter washed by two or three additions of water; after which it is allowed to remain covered with water (being stirred occasionally) for three or four hours, and then the washing is renewed until the greater part of the acid is removed. The rice is now submitted to the caustic alkaline solution, in the manner described under the second improvement.

At the close of the last operation, after drawing off the water, the patentee prefers to give the gum-starch a slight excess of acid: for this purpose, and to prevent any injury to the fabric to which it may be afterwards applied, he employs a vegetable acid (by preference, oxalic acid), adding it in small quantities until an acid reaction is exhibited on the test-paper.

The patentee claims the mode of manufacturing gum-starch, dextrine, or amidine, by raising the temperature of unground rice, whilst macerating in an acidulous solution, and previous to again macerating the same in a solution of caustic alkali.—[*Inrolled in the Inrolment Office, April,* 1845.]

To JAMES BOYDELL, jun., *of Oak Farm Works, near Dudley, iron-master, for improvements in the manufacture of hinges, and of handles for knives and other instruments.*—[Sealed 17th November, 1845.]

THE first improvement in the manufacture of hinges consists in a mode of casting iron and brass hinges, so as to form the pivots or axes in the same piece with one of the flaps.

In Plate XV., fig. 1, shews one of the flaps of a hinge, which is first cast in a suitable mould, provided with cores for forming the cylindrical recesses *a, a,* to receive the pivots or axes on which the flaps are to move; after this flap has been cast, and the cores removed, the other flap is cast thereon, and the pivots or axes are formed in one piece with the knuckles of the last flap, by the fluid metal entering the recesses *a, a.*—Fig. 2, represents the hinge complete. The patentee says, he is aware that hinges have been cast with short conical points to serve as pivots or axes; he does not, therefore, claim the same, excepting when made cylindrical or in the form of long cones with truncated ends, to act as enlarged bearings for the ends of the recesses *a, a.*

The second improvement consists in a mode of casting brass hinges, when separate pins or axes are to be applied after the flaps are cast. Fig. 3, exhibits the two flaps of a brass hinge which are cast on cores, in order to form the knuckle-joints hollow, instead of casting the same solid, and then drilling them. The dotted lines *b, b,* shew the extent of the hole or recess in the knuckle-joints; the pin or axis is introduced at the end *c,* and then the excess of metal at *c,* is beaten down and the pin is thus shut in.

The third improvement consists in casting the flaps for several hinges in one piece, and then dividing them. In casting flaps for hinges, it has been the custom to make a separate mould for each flap, although several moulds are made in the same box or flask; but the patentee proposes to form the moulds in such a manner that several flaps may be cast in the same piece, and afterwards divided. Fig. 4, represents a long casting, suitable for being divided into six hinges. The patterns used in making the moulds may be formed with suitable prominent parts to produce a groove across the flaps at those parts where the hinges are to be separated, as shewn at 1, 2, 3, 4, and 5, and the hinges are to be sawn apart at those points; or when the grooves are sufficiently deep to ensure an even fracture, they may be broken across at those points, and the ends of the hinges finished by grinding.

The fourth improvement consists in annealing cast-iron hinges in coke ovens: thus the expense of a fire for the purpose of annealing is saved, by the employment of the heat produced in the manufacture of coke. The hinges are packed in boxes, as usual, and then introduced amongst the coal to be made into coke; by which means the hinges will be heated as the process of coking goes on, and will cool down with the coke, and be drawn in an annealed state when the coke is drawn.

The fifth part of this invention relates to manufacturing the handles of matchet knives, and other instruments with similar handles. It has been usual to form the blades of matchet knives with flat tangs, on each side of which the half of the wooden handle is placed, and secured by rivets. The improvement consists in making the whole handle of metal, that portion which is to form the handle being rolled out to twice the length required for the handle, so as to allow of half this rolled piece being bent over the other half, and soldered or brazed at the edges; or, in place of having sufficient metal to form the whole handle, there may be only enough for one half, and the other half made out of a separate piece of metal, and soldered or brazed thereon.

The patentee claims, Firstly,—the mode of casting hinges with pivots or axes and recesses in the knuckle-joints, as above described. Secondly,—the mode of casting brass hinges, when the pins or axes are introduced after casting, as above described. Thirdly,—the mode of making cast-hinges, by casting several together, and dividing them, as above described. Fourthly,—the mode of annealing hinges, by employing the heat of coke-making, as above described. Fifthly,—the mode of making the handles of matchet knives and other instruments, as above described.—[*Inrolled in the Inrolment Office, May,* 1846.]

To ARTHUR SMITH, *of St. Helen's, in the county of Lancaster, manufacturing chemist, for certain improvements in the manufacture of soda-ash.*—[Sealed 23rd October, 1845.]

THIS invention of improvements in the manufacture of soda-ash, consists in the employment of the vat-waste or the residuum of the lixiviation of the black ash, instead of fresh calcareous matter, for making the mixture of sulphate of soda, carbonaceous matter, and chalk or lime, which is subjected to decomposition in the reverberatory furnace.

The mode of carrying out the invention is as follows:—The vat-waste or residuum obtained from preceding operations of the soda manufacture is mixed, in suitable proportions, with ground coal, slack, or charcoal, and salt cake, or sulphate of soda; this mixture is exposed on the hearth of a reverberatory furnace, to a strong heat, with due stirring and turning over, until the mixture becomes fully fused and decomposed. The vat-waste is preferable for the above purpose after it has been for some time exposed in a heap to the action of the atmosphere, whereby it becomes deprived, to a considerable degree, of its sulphurous impregnation. The proportion of vat-waste to be used for a certain weight of sulphate of soda and slack depends upon the proportion of calcareous matter in the waste, and can therefore be regulated for each particular heap only by trial or experiment.

The patentee claims, as his invention, the substitution of the said vat-waste in place of fresh calcareous matter, either in whole or only in part, in mixing the materials for the reverberatory operations of the soda manufacture.—[*Inrolled in the Petty Bag Office, April,* 1846.]

Specification drawn by Messrs. Newton and Son.

To THOMAS SAMUEL PARLOUR, *of Park-road, Holloway, in the county of Middlesex, Gent., for improvements in propelling vessels.*—[Sealed 20th November, 1845.]

THIS invention consists in an improved form of propeller for propelling vessels, shewn in Plate XV., at figs. 1, and 2; fig. 1, being an elevation of the propeller, and fig. 2, a vertical section in the line A, B, of fig. 1.

The patentee's specification, which we give entire, is as follows:—" My invention consists of an improved construction of propeller, which is formed by taking a hollow cone, of sufficient thickness, and cutting it through the vertex at right angles to the plane of its base, so that the two parts may be equal; these are affixed to arms, as represented in the drawing; and these arms are affixed to a boss; which boss has a hole through it, for the purpose of securing it to the shaft. The number of half cones forming the propeller may vary. The angle also of the vertex of the cone may vary; but the most satisfactory results have hitherto been obtained by taking a half-cone, whose angle at the plane of the base was thirty-two degrees. By extending the surface of the half-cone, a greater propelling surface is obtained.

" I do not confine myself to the details here given; but I claim the applying part of the surface of a cone, or any approximation to that surface, when used for the purpose of propulsion."—[*Inrolled in the Inrolment Office, May,* 1846.]

To WILLIAM YATES, *of Manchester, in the county of Lancaster, upholsterer, and* DENIS DOLAN, *of the same place, scagliola manufacturer, for their invention of certain improvements in plastic manufacture or composition; part of which is applicable to decorative and useful purposes, and part as a fire-proof cement or plaster.*—[Sealed 21st January, 1845.]

THESE improvements consist in the novel and peculiar combination of certain materials employed in the manufacture of cements and other plastic compositions, and also in the process or method whereby such novel and intimate combination of materials is effected. The differences in the proportions, and of the materials employed, will depend upon whether the composition be required for decorative, hydraulic, or fire-proof purposes. Hitherto most plastic compositions or cements concrete or set on the outer surface or side next to the atmosphere first, and from this cause they are always found liable to be detached or separated from the wall, or whatever surface they may be placed upon, and hence ultimately become easily broken, and flake off, which is the principal reason that all cements have hitherto been so defective in case of fire, or any extraordinary application of heat or damp; as it will be found in all cases where known cements have as yet been used, that in case of extreme heat from fire they immediately expand, and fly or fall from the surface of the structure they may be placed upon, from the weakness or insufficiency of bond or union between the cement or plaster and the ground upon which it may have been placed.

The chief objects of the patentees are to produce a plastic composition that will set or concrete first upon the surface upon which it is applied, and so on gradually, until it arrives at the outer face of the work, and at the same time have such adhesive or growing qualities to the material that it will scarcely be possible, by any outward force or violence, to destroy or overcome its adhesion; and also to produce such a composition as will resist the action of fire or water.

These improved plastic compositions or manufactures may be applied to any purpose for which ordinary mortar, plaster, or cement is used, either in setting bricks or stones, or plastering walls or ceilings, and ornamental and other works. The preparation is formed, as in the following formula, by two separate processes, the results of which are, by admixture, made to act upon each other:—Take 1 lb. of bark or ¼ lb. of gall-nuts, which crush or grind fine, and boil them in two quarts of water, continuing the heat until one-half of the water has evaporated, so that only one quart shall remain, which mix with 7 lbs. of dry fire-clay, employing as much of the decoction as the last-mentioned quantity of clay will absorb. Dry the clay thus prepared, then grind and repeat this operation with such a quantity of the like decoction as will ensure the saturation of the fire-clay by the tannin principle; or, in other words, put into the clay as much tannin as it is capable of containing. Dry the clay in this state again, and finally grind or otherwise reduce it to the state of fine powder. Where bark or gall-nuts are not at hand, any other tannin may be used in equivalent proportion. This is the first preparation. The second is made as follows: namely, dissolve ½ lb. of glue in a pint of water; then to the solution add a ¼ lb. of slacked or hydrate of lime, and let the mass be brought, by the addition of water, to the consistency of a beaten egg or thick cream. This mixture must be boiled, and carefully mixed by stirring, until it is thoroughly blended and of uniform constitution. Now add 7 lbs. of dry fire-clay, and work the materials together into a paste or putty, and then dry the mass produced. The mode of drying resorted to is either to expose it to the action of the sun or to an artificial heat, not exceeding that of boiling water; or, in other words, not above 212° of temperature. When it has been thus rendered perfectly dry, break it into lumps, and then, by a mill or otherwise, grind or pulverize the whole of the mass to the state of a fine powder. This may be considered as the second preparatory process, being distinct from the preceding. These two separate compounds or mixtures are now to be carefully and intimately blended together until they are rendered uniform. To this fine dust or powder add eight parts, by weight (in a dry state), of sulphate of lime (plaster of Paris), and mix all well together by running it through sieves or riddles, or in any other way, so that the materials may be evenly and thoroughly incorporated. To the materials in this state add of silica sixteen parts (or twice the weight of sulphate of lime), in the state of well washed and fine dry sand, or in a corresponding proportion when, instead of the sand, any other silicious substance, as granite, stone, or flint, for example, is employed. When the whole has been duly mixed, the process is finished, and the article obtained. It is, for some purposes, found advantageous to add afterwards a small quantity of solution of alum; and though this addition is not necessary, it is claimed as part of the process, fitting the article better for peculiar applications, and thus to be used or omitted, as occasion may require. The substance thus obtained, either with or without the alum, is used by adding water to it, until it is of the usual consistency of common mortar or plaster, and applying it, in the ordinary way, to walls, ceilings, interior coatings, or other surfaces. The preparation, as above described, is applicable to the purposes of rendering buildings, boxes, or safes fire-proof.

Secondly,—When the cement or plaster is required for hydraulic purposes, or setting under water, or in foundations, outside walls, or other such like work, exposed to water, damp, or rain, it is requisite the formula should run as above, except instead of, or in connection with, the fire-clay, an equivalent quantity of oxide of lead, iron, or iron filings, copper, or any other convenient oxide is substituted, and applied in the same manner as the fire-clay in every respect; when the composition will be found perfectly water-proof, extremely adhesive, and of the greatest strength, and useful for building water-walls, docks, or arches, or any other structure where strength and water-resistive power is required.

Thirdly,—For colored or fancy plaster composition or cement, such as imitation marble, scagliola, or other such like fancy work, the following alteration is required in the formula:—1 lb. of glue to 2 oz. of good slacked lime, which must be boiled, and diluted, and mixed, as above described, in preparing the fire-proof cement, and to one part of this mixture add the coloring matter, and wet grind it, as in preparing common paint or covering; after which carefully dry and grind it to fine powder. To the other parts add about 14 lbs. of carbonate or sulphate of barytes or any other appropriate mineral (instead of fire-clay), which make into paste or putty, and then dry and pulverize or grind to fine dust or flour, as in preparing the fire-proof cement. When so ground, mix these two separate powders together, then add, of sulphate of lime, eight times the weight of the barytes or other mineral. In preparing this colored plaster or cement, the operator must use his own judgment in mixing or combining the colors that are suitable to produce any particular or required tint or effect in color. This cement is intended for forming any decorative work that may be required, that is, by first forming a groundwork of the first described or fire-proof cement, upon which put a skimming or coating of the colored cement, and they will both concrete together, forming one solid substance, and when dry will bear a high polish. If any imitation or artificial marble be required, mix the colors, and apply them as in producing ordinary scagliola; and if the foundation be the fire-proof cement, the most beautiful columns, pilasters, panels, and slabs, or other mouldings, may be formed, and with this advantage,—that, owing to the adhesiveness and union of these two mixtures or cement, blistering and shelling off, as in scagliola work, will not occur. This cement may also be laid in solid colors, and finished to a most beautiful surface. Its effect is exceedingly beautiful, and walls may be wrought or decorated in panels, figures, flowers, &c., as desired. In mixing the improved cement for flooring or pavement, coarsely ground or pulverized granite, instead of sand, is put in the last coating or skimming, and mixed with oxide of lead, instead of fire-clay. This forms upon the fire-proof cement a perfectly secure fire-proof floor, with a surface harder than that of an ordinary stone, and may be employed as a plain or ornamental pavement or flooring, if laid in the form of mosaic tiles or tracery, as different colored granite may be procured with ease. To form a composition to represent wood carving, cornices, or any other ornamental decoration, where the weight of the plaster is objectionable, take to 1 cwt. of sulphate of lime the same quantity of fire-clay and glue, as in the second preparation; and add three times the quantity of these ingredients, by measure or bulk, of ground spent bark (such as the tanners throw aside), which must first be well washed and dried in an oven or kiln, and ground as fine as possible; and where strength in the composition is requisite, as in making benches, seats, or tables, take the hydraulic mixture of clay and glue, that is, put instead of clay an equivalent of the oxide of lead, iron, or copper, and mix all well together. Where bark is not attainable, take the same quantity of common saw-dust, or an equivalent quantity or amount of paper, or woollen, silk, linen, or cotton fabrics, which must be previously well boiled and cleansed from all extraneous matter, and then well dried and ground or pulverized to a fine powder. To three parts of this powder add the first and second preparations with the sulphate of lime, as in the fire-proof cement, and blend all well together. To this mixture add water sufficient to make it of the consistency of paste or putty, which press into moulds, well oiled, to prevent the same from adhering to the moulds. A hand press will greatly add to the perfecting of the impressions of the carvings.

The patentees state that they do not claim any of the before named well-known constituents, but that which they claim is, the mixing and applying of such constituents in the novel and peculiar mode before described.—[*Inrolled in the Inrolment Office, July,* 1845.]

To EDWARD AUGUSTIN KING, *of Warwick-street, in the county of Middlesex, Gent., for improvements in obtaining light by electricity,—being a communication.*—[Sealed 4th November, 1845.]

THIS invention consists in the application of continuous metallic and carbon conductors (intensely heated by the passage of a current of electricity) to the purposes of illumination.

The metal to be used for the above purpose is that which, while it requires a very high temperature for its fusion, has only a slight affinity for oxygen, and offers a great resistance to the passage of an electric current. Platinum, though not so infusible as iridium, has but little affinity for oxygen, and offers a great resistance to the passage of the current, and as it is abundant and easily worked, appears to be preferable to any other metal. It should be reduced to the thin sheets known as leaf platinum, which may be done by the ordinary process of the gold beater; but the patentee prefers to effect this by placing a piece of platinum-foil between two thick plates of rolled copper, and reducing the whole to a thin sheet by rolling, and then, on separating the copper plates, the platinum leaf will be found of uniform thickness in every part; by this means the platinum may be obtained so thin that, on holding it before a printed page, the letters can be distinguished through it. A strip is to be cut from the platinum leaf of a width proportionate to the quantity of the current (which, with Grove's cells, having platinum plates three inches long and two inches wide, is about one-fourth of an inch), and of a length proportionate to the intensity (which, of course, varies with the number of cells); care being taken to cut the strip of an equal width throughout, and with a clean edge, as otherwise it will be unequally heated, and will be fused in one part before the other parts have attained a sufficiently high temperature to produce a brilliant light.

The strip of platinum is to be suspended between two forceps in the apparatus represented in vertical section at fig. 1, Plate XV. *a,* is a square brass bar, fixed on the wooden stand *b,* and having a binding-screw *c,* at its lower end; upon this bar two sockets *d, e,* slide, carrying the arms *f, g,* which are terminated by broad forceps, tipped with platinum, and opened or closed by milled screws *h, i.* The upper arm *f,* is fixed at the top of the bar *a,* by means of the screw *j*; and the position of the lower arm *g,* is adjusted by turning the nuts *k, k,* upon the screwed rod *l,* which passes through the arm *g*: the socket *e,* of the arm *g,* is lined with ivory or other non-conducting substance, to prevent any metallic communication between that arm and the bar *a.* *m,* is the platinum leaf, which is held by the two forceps, and is included in the electric circuit by attaching one of the wires from the battery or other apparatus to the binding-screw *c,* at the bottom of the bar *a,* and the other wire to the binding-screw *n,* at the bottom of the rod *l.* The current should be one of considerable intensity, and the distance between the forceps should be sufficient to prevent the platinum from being fused. *o,* is a glass shade, which serves to screen the platinum from currents of air, dust, &c.

When carbon is used, it becomes necessary, on account of the affinity this substance has for oxygen at a high temperature, to exclude air and moisture from it, which is best effected by enclosing it in a Torricellian vacuum. Fig. 2, is a vertical section of the apparatus employed for this purpose. *a*, is a glass tube, similar to those used for barometers, except that its upper end is enlarged into a cylindrical bulb, and a stout platinum wire sealed in at the top. The upper end of the wire is furnished with a binding-screw *b*, and the lower end is screwed into the iron piece *c*, to which the forceps *d*, is attached; the piece *c*, is connected, by a porcelain rod *e*, with a similar piece *f*, that carries the forceps *g*; and the piece of carbon *h*, is held between the forceps *d*, and *g*;—*i*, is a copper wire, which is attached to the piece *f*, and extends to the bottom of the tube. The tube is filled with mercury in the same manner as a barometer (the air being carefully expelled, as usual); its length, independent of the bulb, should be about thirty inches, so that a vacuum will be formed in the bulb when the tube is inverted in a cup of mercury. The instrument is included in the electric circuit by connecting one of the wires from the battery or other apparatus with the binding-screw *b*, and the other with a wire which enters the mercury in the cup at the bottom of the tube. The circuit is thus completed by the column of mercury; and when it is depressed in the tube, by the formation of vapour of mercury in the bulb, the connection is preserved by the wire *i*. That form of carbon found in coal-gas retorts which have been long used, is well suited for the purposes of this invention, and may be worked into the form of small pencils or thin plates, by the aid of the saw and file. As carbon will bear a very high temperature without fusion or volatilization, it may be employed when a very intense light is required.

If an intermitting light be required, for light-houses or other purposes, it may be obtained by breaking the circuit at intervals by clock-work. When the apparatus is suitably sealed, it may be applied to submarine lighting, and to the illumination of places where it is necessary to guard against the inflammation of highly combustible or explosive compounds, as in powder magazines, mines, &c. When the current is of sufficient intensity, two or more lights may be made in the same circuit; care being taken to regulate the power, by increasing or diminishing the number of armatures (if a magneto-electric machine be employed), or the number of cells (if a voltaic battery be used), so that the united resistance of the strips of platinum or carbon shall be sufficient to prevent the passage of such a quantity of electricity as would destroy them.

The patentee claims the application of continuous metallic and carbon conductors, intensely heated by the passage of a suitably regulated current of electricity, to the purposes of illumination, as above described.—[*Inrolled in the Inrolment Office, May,* 1846.]

To Charles Pooley, *of Chorlton-upon-Medlock, in the county of Lancaster, cotton spinner, for improvements in certain machines used in preparing to be spun, and in spinning cotton, wool, and other fibrous substances.*—[Sealed 27th March, 1845.]

This invention consists, firstly, in improvements in carding-engines, whereby cotton and other fibrous substances may be carded with greater expedition and less waste than by the ordinary construction of carding engines. Secondly, in an improved construction of roller, employed in the drawing-head of such machines, as also in other preparation machines; which rollers (commonly called "top rollers"), by reason of their elasticity, will not become grooved or hollowed out on their surface, as is ordinarily the case with those at present in use. In Plate XV., fig. 1, is a vertical section of part of a carding engine, shewing the working parts with the improvements applied thereto, and fig. 2, is a front view of a portion of the same. *a,* is the main drum or carding cylinder; *b,* is the doffer cylinder; and *c, c,* are the top cards, placed in the usual way above the cylinder *a.* The lap of cotton for feeding the engine is shewn at *d,* and is supported by the rollers *e,* and *f,* which by their revolution cause the cotton to unlap, as will be now explained. Upon one end of the shaft of the doffer cylinder *b,* is a cam *g,* (shewn by dots in fig. 1,); this cam acts upon one end of a lever *h,* and causes it to raise a rod *i,* attached to its other end; but when the cam ceases to act, the rod *i,* will fall by its own weight. The lower end of this rod *i*, is provided with a hook or catch, which is intended to take into a ratchet-wheel, keyed upon the shaft of the roller *e*, and by this means the doffer-cylinder *b*, will (through the action of the cam *g*, lever *h*, and rod *i*,) at each rotation cause the roller *e*, to perform part of a revolution, which movement is communicated by gearing to the other roller *f*, which also supports the cotton. *k*, *l*, are the feed-rollers, which take up the cotton as it is unwound from the lap *d*, and convey it into the engine. These rollers receive motion from a pinion on the doffer-shaft *b*, which takes into a cog-wheel *m*, itself in gear with a wheel *n*, on the feed-roller *k*; the roller *k*, being also provided with a pinion in gear with a similar pinion on the roller *l*, communicates the desired motion to that roller. *o*, and *p*, are a series of small card-rollers, commencing at a short distance under the lower feed-roller, and continued under the carding-cylinder, and up to within a short distance of the top cards. Of these card-rollers, *o*, are the workers, and *p*, the clearers. At the commencement of the series the workers and clearers are placed alternately; in the next portion of the series two workers are placed for one clearer; and for the remainder there are four workers to one clearer.

Upon one end of the workers and clearers *o*, and *p*, a ring of pins or teeth is provided, in order to take into their respective endless chains *q*, and *r*, by which they are made to rotate. These chains (the position of which will be best seen at fig. 2,) receive their motion from a double-chain wheel *s*, on the shaft of the cog-wheel *m*, (as shewn by dots in fig. 1,) and thus communicate a slow revolving motion to the rollers *o*, *p*, which are mounted in bearings, attached to segments provided with slots, and fixed to the side-frames of the carding-engine, as shewn by dots in the figure. The patentee remarks, that he has shewn the workers and clearers in such number, size, and arrangements, as he considers best; but the same may be modified without affecting the nature of his invention.

When the cotton has passed under the top cards *c*, it is stripped off the cylinder *a*, by the roller *t*, and delivered to the doffer-cylinder *b*, from which it is taken off by the doffer-comb *u*, and conducted through a trumpet-mouth to the roving-can in the usual manner. The roller *t*, is driven by means of a strap, which passes over a pulley *v*, keyed on the shaft of the carding-cylinder, and over a small pulley *w*, on the same axis as the wheel *x*, which takes into a pinion on the shaft of the roller *t*, and communicates motion thereto. A quick rotary motion being thus given to the roller, the cotton will be more completely stripped from the main cylinder than if taken off from that cylinder by the doffer *b*, as ordinarily practised. In order to prevent the cotton from flying off the roller *t*, by reason of its quick revolutions, a cover, of any suitable construction, may be placed above and below the drum.

The second head of the invention is thus described:—" I place, side by side, upon a spindle, having a fixed flange at one end, a number of washers, made of woollen cloth, felt, or other suitable material; and after a sufficient number, to give the required elasticity, has been so placed, I force and keep them in their position by another flange, which is screwed or otherwise fastened upon the spindle. Upon a roller so formed I put an ordinary leather cover; and by an elastic roller being so covered, the leather on its surface does not wear into ridges or grooves."

The patentee claims, Firstly,—combining revolving clearers with revolving workers, placed below the plane of the axis of the drum or main cylinder, when the feeding and doffing takes place on the same side of the drum or main cylinder. He also claims the application of a chain to work revolving clearers or carding-engines. Secondly,—the application of the roller *t*, intervening between the main cylinder and the doffer-cylinder, in such a manner that the carded fibres are transmitted from the main cylinder to the doffer-cylinder by that drum. Thirdly,—the arrangement of apparatus, before described, for delivering off the lap of cotton or other fibrous substance from the lap-roller. And, Fourthly,—the construction of a " top roller," by combining a cover of leather or other suitable material with a body made of washers of cloth or other suitable substance.—[*Inrolled in the Inrolment Office, September*, 1845.]

To Eugene François Vidocq, *of Galerie Vivienne, Paris, in the kingdom of France, for improvements in combining materials to be employed in the manufacture of tea-trays, boxes, trunks, table-covers, oil-cloth, and other articles, to be used in place of the materials now employed in such manufacture.*—[Sealed 20th November, 1845.]

This invention consists in the application of scrapings, parings, cuttings, and shavings of leather for making paper, card-board, tea-trays, and the other articles above mentioned; and also in the combination of the same with other materials for the like purpose.

The scrapings, parings, cuttings, and shavings of leather are obtained from tanners, curriers, and shoe-makers, and, after having been thoroughly cleansed by washing, are placed in an ordinary paper engine, and treated in the same manner as rags are treated in the manufacture of paper (except that the bleaching is omitted) until they are brought into the state of pulp. This pulp may be made into sheets, which, when dry, are suitable for making tea-trays, boxes, trunks, table-covers, &c.

When it is desired to render the leather hard and compact, the patentee introduces tan, gluten, resin, alum, and blood, into the pulp, in the proportion of six parts, by weight, of each of these materials to one hundred parts of pulp. After the pulp has been made into sheets, a coat of glue is applied to their surfaces, and they are placed in a heated chamber to dry; when thoroughly dry, the surfaces of the sheets are covered with a coating of fish oil, and then they are ready to be manufactured into various articles.

If the leather is required to be made pliable, the patentee adds to every hundred parts of pulp, five parts of each of the seven following ingredients, viz., the residue of cotton or wool, oakum, old waste paper, farina of potatoes, clay, animal excrements, and the dust of hemp or flax. The materials are mixed together, and the sheets treated as before explained.

The patentee claims, Firstly,—the employment of scrapings, parings, cutting, and shavings of leather, reduced to pulp, in the manufactures above mentioned. Secondly,—the combining with the scrapings, parings, cuttings, and shavings of leather, the materials above mentioned.—[*Inrolled in the Inrolment Office, May,* 1846.]

Scientific Notices.

Translated from Foreign Works, for the London Journal of Arts.

ON THE MANUFACTURE OF STEEL.

BY DR. CARL SCHAFHAEUTL.

[*Revue Scientifique et Ind. du Dr. Quesneville.*]

IRON, in the composition of which a portion of the silica is replaced by manganese, will, while being smelted, rather part with the latter than the former. From this it follows, that at the moment when the iron is on the point of passing from a liquid to a solid state it will retain sufficient silica to form steel. For this reason, during the whole process of refining, the current of air is caused to act rather upon the surface of the metal than through the interior of the fluid mass, in order to avoid the combustion of too much carbon and silica; from which it follows that the casting becomes malleable without losing a sufficient quantity of silica to constitute iron, properly so called, and the product is raw or blistered steel. The casting which does not contain any manganese, loses, by the effect of combustion, a portion of silica proportionable to the quantity of carbon burnt, and furnishes iron only, as a definitive product.

It is simply to the mechanical action of the hammer that the distinctive features of steel, as compared with cast metal, are due. In order to effect this change, the blistered steel is broken into pieces and melted down; they are afterwards tempered—again broken into pieces, and welded together at a good welding heat. The steel will be the more malleable, and possess more tenacity and uniformity of texture, in proportion to the number of times these operations are repeated. The product is called "wrought or shear steel."

Steel of cementation and cast-steel.—When bar-iron is heated to a white heat, or even melted in close vessels containing coal or carbonaceous substances, it takes up a certain quantity of carbon, and is transformed into castings of various kinds.

If the iron contains, together with silica, phosphorus and arsenic in proportions suitable for softening the granular particles of iron during their combination with the carbon, by keeping it for a certain time at a red heat, with powdered charcoal, a casting is obtained, which, when submitted to the action of the hammer, or of rollers, furnishes a product known as "steel of cementation." During this operation, the stratum of oxide which covers the particles of iron inside loses its oxygen, and passes again into a metallic state; but the vacant spaces occasioned by this are filled up, as the ferruginous particles, which are in a semi-fluid state, re-assume the crystalline form. The carbonic oxide gas, in escaping, forms large blisters on the surface of the metal, under which the softened mass crystallizes. On being broken, the interior of these blisters, instead of appearing of a dark color, indicating the presence of a stratum of protoxide, presents a brilliant and rainbow-tinted appearance, the yellowish and bluish tints distinguishing bronzed steel being observable. If this steel be wrought at a white heat, these blisters will weld in with the mass with the greatest facility. During cementation, the carbon combines with the component particles of the iron in various proportions, depending in a great degree upon the chemical composition of those particles. It is, therefore, a vulgar error to suppose that steel of cementation contains more carbon at the surface than in the interior, as stated in all technological treatises. Thus, in the best Dannemora steel, it very frequently happens, when the cementation is finished, that the centre of the metal contains a much greater quantity of carbon than the superficial portions. It may also happen that steel produced from the best Dannemora bar-iron will differ in an extraordinary manner as regards hardness, in various portions of the bar; and for this reason, in steel works in England, the bars of steel are always broken into several pieces, in order to class those pieces together which are the most similar in quality.

If ordinary iron be submitted to cementation, that is to say, iron in which the proportion of silica is ordinarily insignificant, when compared with that of carbon, and that independently of this the iron is deficient in the quantity of phosphorous and arsenic necessary for easily softening the metallic molecules, only carburet of iron and a little siliciuret of iron are produced, but the carbon does not combine with the silica. In this case the steel obtained is deficient in malleability and tenacity,—for this reason, that the molecules will not unite or crystallize until they have taken up a quantity of carbon more than sufficient to produce steel. With regard to simple carburetted iron (when it contains more carbon), it either will not harden at all when tempered, or becomes friable and brittle when heated to redness, even when it does not contain more carbon than steel of good quality.

The fracture of the steel of cementation, now under notice, is grey and dull, while steel of good quality is of a silvery aspect, and presents cubical crystals.

The best steel can only be obtained by the cementation of forged iron. Whilst the metal is combining with the carbon, the iron must not enter into a complete state of fusion, as in that case groups of crystals, each possessing a different degree of carbonization, would be formed; even the best Dannemora iron will not furnish a uniform product fit for purposes of commerce when melted with substances containing carbon. I am well aware that the experiments of Clouet, Hachette, and Bréant, may be opposed to me, as set forth in various treatises upon chemistry, but these are unfortunately mere laboratory experiments, the authors of which have prudently concealed, or passed over in silence, all those which were unsuccessful. When the operator has obtained a regulus at the bottom of his crucible, and when, after immense trouble, he has succeeded in extracting from it a small portion of steel capable of being worked, he immediately hastens to publish his pretended discovery in some journal, of which others become faithful and credulous echoes; thus, since the manufacture of steel has become the subject of chemical inquiry, complaints are daily becoming more frequent upon the difficulty of procuring steel capable of resisting the treatment to which it is subjected in the arts. If the persons who preside over the coining department either at London or Munich, were consulted, they would all agree in saying that it is now very difficult to meet with the quality of steel necessary for making the dies. Even in England good steel becomes more and more scarce. With regard to the manufactories of cemented or cast-steel established upon the continent, they furnish products, the quality of which is so uncertain, that the workman is often reduced, after having lost his time and trouble, to throw certain portions away, as they want the necessary uniformity and tenacity.

All the artificial alloys of steel with silver, of which so much has been said, are not fit for any thing, and are never met with in commerce.

When the steel has been withdrawn from the cementing furnace, and after it has been broken, and the pieces drawn out, they are submitted to one of the two following operations:—the pieces after being sorted are piled one upon the other and welded together (this is called faggoting the steel), or the sorted pieces are placed in clay crucibles of a nearly cylindrical form, and cast in a reverberatory furnace, in which two crucibles are placed, one behind the other, upon cakes of fire-clay; the orifice of these crucibles is closed by a flat cake of fire-clay. The bars of cemented steel, as above mentioned, are divided into pieces of one or two inches in length; these pieces are distributed, according to their degree of carbonization, in vessels fixed to the walls of the place in which the melting is carried on.

These different qualities of steel are generally combined in such a manner as to obtain a product the best suited for the purposes to which cast-steel is ordinarily applied.

In all treatises on practical chemistry it is asserted, that in order to melt steel, it is to be covered with a layer of glass or blast furnace slag; that the opening of the crucible is luted, or at least becomes firmly fixed during the operation; these assertions are, however, erroneous. In the first steel manufactories in Sheffield, steel only is put into the crucibles. With regard to the cover, it is evident that it must not adhere to the crucible, as it is necessary the operator should remove it from time to time with a bar of iron, in order to ascertain the state of the metal.

In order to obtain steel of the best quality, it is not sufficient that the melted mass be run into moulds: the most essential point is to make the casting at the proper time, and for this purpose the operator must be guided by the quality of the steel. This is the duty of the workman, who from long practice can tell the suitable point of fusion, either by simple inspection or by means of his bar of iron, with which he merely touches the surface of the metal, being most careful not to plunge it into the melted mass. As the quality and uniformity of the steel depend in a great measure upon the experience and judgment of the workman who directs the casting, it follows, that even in England, a good caster is much sought after and well paid.

It is not difficult, therefore, to explain why so many of the attempts made to establish manufactories of cast-steel in Germany have failed, and will again fail. Thanks to the errors propagated by technical works, and by the assertions of superficially informed travellers, who had frequently been purposely deceived, it was imagined that in order to obtain English steel of good quality, it was only necessary to melt cemented steel in a crucible, and afterwards pour it into moulds, when in a state of fusion.

As soon as a crucible is emptied, it is replaced in the oven; each crucible serves for one day's work, *i. e.*, four or five castings, after which it is thrown aside. For ordinary purposes, the steel is run into cast-iron moulds of a prismatic form, previously heated and closed. When the steel is required for making saw-blades, plates, &c., it is run into large moulds of a parallelopiped form. Steel which is very hard and highly carbonized, contracts considerably in the moulds; great skill is therefore required to run it into the moulds in such a manner that no vacuum may be produced. In that part of the prism corresponding to the jet, a funnel-shaped aperture, from one to two inches deep is formed; this is detached and melted down with other pieces of steel.

The transverse fracture of a prism of hard steel is silvery, and has a number of rays radiating from the centre; steel less hard is on the contrary of a uniform granular and crystalline texture. This steel possesses all the brittleness of cast metal.

By fusion, steel of cementation acquires peculiar properties, and does not sweat so much as before casting.

When steel is produced from iron of bad quality, and carburets of a different nature are produced during cementation, the melting, instead of improving it, renders it much worse; as, in that case, the different carburets of iron, which are of inferior quality, separate still more during cooling. This has given rise to an old saying, well known among English founders, that "when the devil is put into the crucible, nothing but the devil will come out."

It is to the existence of these heterogeneous metallic carburets, which are produced during cementation in iron of inferior quality, and which form new combinations during the fusion of the metal, that the complaints of workmen working in steel are to be attributed. In fact, these carburets being only, so to speak, agglutinated, even in bars of forged steel, each of them, at the moment of tempering, is contracted or dilated more or less than the one immediately adjoining it, so that from that time a separation commences between the unequally carbonized layers; in other words, a flaw or crack is produced, which may be distinguished by a peculiar noise at the moment when the steel is plunged in the water, or, at least, there is a tendency to separation, which only requires the co-operation of an exterior cause, such as a shock, to effect it. This is often observed in razors, &c.

The transverse fracture of cast-steel ought to present a perfectly homogeneous surface, when the bar is broken by a sharp blow, after being cut or marked with a chisel. The slight inequalities which are perceptible ought to be undulating, and to blend insensibly at their bases with the rest of the metallic surface. When, on the contrary, they stand out perpendicularly, the conclusion may be arrived at, that this portion of the bar was the point of contact of two unequally carbonized layers, which, by separating either at the moment of tempering, or at a later period, had inevitably given rise to this rupture.

METHOD OF EXTRACTING THE IODINE AND BROMINE CONTAINED IN THE SALTS AND MOTHER LIQUOR OF KELP SODA.

[*From the Bulletin de la Société d'Encouragement pour l'Industrie Nationale.*]

The Société d'Encouragement, in its general meeting of the 5th June, 1839, decreed a gold medal to *Messrs. Delaunay, Couturier, and Villedieu*, of Tourlaville, near Cherbourg, for their processes for extracting iodine and bromine from soda obtained from the sea-weed, which is gathered in large quantities on the shores of Brittany.

The importance of this manufacture was made known in a report inserted in the *Bulletin* of August, 1839; but it did not contain a description of the process. We will, therefore, make up for this omission, by giving an extract from the patent for ten years, taken by Messrs. Couturier, on the 22nd May, 1835, and which has now become public property.

1st. *Extraction of Iodine from Kelp Soda.*—The mother waters of this soda having been concentrated to the greatest possible degree, are left in any suitable vessel, in order to allow the salts, which may be separated during its slow crystallization, to deposit; they are afterwards drawn off, and the small quantity of alkaline carbonate, which is always contained in these mother liquors, is saturated by means of sulphuric acid. In order to be certain that the free alkali of the mother liquors is saturated, the point of saturation must be slightly exceeded, which is ascertained when, after having sufficiently agitated the mother liquor to which the sulphuric acid has been added, a strip of litmus paper plunged into it is slightly reddened.

It often happens that the mother liquors of kelp contain a considerable quantity of hyposulphites which precipitate sulphur, and by the decomposition of which sulphurous acid is disengaged; in this case sulphuric acid is added, by small quantities at a time, until no more sulphur is precipitated. This clarified liquor is put into large vessels, which must not be quite filled, to allow the liquor to be stirred ftom time to time.

The bottles having been placed upon a table, a current of chlorine gas is directed to the bottom of the liquor they contain. This gas must not be disengaged too rapidly, otherwise a great part of it will be lost by traversing the liquor without being dissolved: attention to this is also necessary, in order to ascertain when to stop. It is important that the liquor should be agitated as often as possible, to enable it to combine with the chlorine gas which accumulates in the empty part of the bottles.

The chlorine gas, which is mixed with these mother liquors, acts first upon the bases of the iodides, saturates them, and separates or precipitates the iodine; this latter appears at first in the form of a reddish substance, which thickens the liquor, but it soon forms into brown flakes, which fall to the bottom. When the liquor appears no longer to be colored red, a small quantity must be poured into a glass, and left for a time to allow the iodine floating therein to settle; after which some few drops of concentrated solution of chlorine are poured into the clarified liquor: the passage of the chlorine must be discontinued as soon as the solution ceases to thicken the mother liquor, which, on being left in a quiescent state, allows the iodine to settle at the bottom in the form of a thick layer of brilliant brown flakes.

If the iodine is required in large flakes, the supernatant liquor may be decanted off immediately, and washed in a small quantity of cold water; it is then to be put into a retort of glass or porcelain, and sublimed; a long tube of glass, of sufficiently large diameter, being adapted to the neck of the retort. The iodine is volatilized by the heat in the form of violet-coloured vapours, which are first condensed in the neck of the retort, and afterwards in the tube, in the form of small plates or flakes, having a metallic lustre. When the vapours cease to be perceptible, the operation is completed: care must be taken to keep a cloth constantly wetted with cold water upon the whole surface of the tube. In working on a large scale, the products of several operations are united, left to drain, and sublimed as above described.

2nd. *Extraction of the Bromine.*—The mother liquor having been completely exhausted of iodine, is introduced into a tubular retort until it is half full; powdered peroxide of manganese and concentrated sulphuric acid of commerce are to be added to it, and an apparatus composed of three recipients, which communicate by means of pipes ground with emery is adapted to the neck of the retort: the distillation is then proceeded with, care being taken not to let it boil too fast. The bromine which is separated by this operation is volatilized and disengaged in the form of gold-coloured vapours, which are partially condensed in the neck of the first receiver in the form of streaks and drops of a reddish-brown liquid, which run down by degrees into the receiver; but, as a considerable quantity of water is volatilized at the same time, it is condensed also, and floats upon the bromine, which occupies the lowest part of the liquor. When the colored vapours cease to be disengaged from the retort, the fire is removed; a fresh quantity of peroxide of manganese and sulphuric acid are then added, the retort is closed, and the fire again applied. If a sufficient quantity of these substances has been added at first, all the bromine will have been extracted; it then only remains to collect that which is below the liquor condensed in the receiver; this is done by means of a glass funnel furnished with a cock. When the separation is well effected, the end of the funnel is placed in a bottle, the cock is gently opened, and the bromine runs into the bottle; the cock is shut the instant all the bromine has run through and the water is about entering. This water holds a considerable quantity of bromine in solution, which is separated from it by collecting the residuum and saturating it with a sufficient quantity of potash. The product of this saturation is afterwards evaporated to dryness, and the residue is calcined at a dull red heat with a small quantity of coal-dust; it is then dissolved in just a sufficient quantity of water; the solution is filtered and treated in the apparatus with peroxide of manganese and concentrated sulphuric acid, as above described.

The bromine thus obtained is rectified by means of distillation.

ON THE MANUFACTURE OF ARTIFICIAL ULTRAMARINE:—BY M. C. P. PRUCKNER, MANUFACTURING CHEMIST, AT HOFF, BAVARIA.

[*From Erdman's Practical Journal of Chemistry.*]

M. M. GUINET & ROBIQUET were the first persons who manufactured artificial ultramarine on a large scale, for commercial purposes: in 1830, Levercus established a manufactory in the environs of Cologne, and in 1841, M. M. Leykauf Heine & Co., set up works for the manufacture of artificial ultramarine, where ultramarine of every quality and price is produced for commercial purposes.

The process employed by these gentlemen has not been published; in consequence however of our personal dealings with them, and the experiments which they suggested to us, we are enabled to give an idea of the manufacture, by which we hope to throw some light upon this branch of science.

We will first say a few words upon the choice of the primary substances to be employed, which are argil or potter's clay, sulphate of soda, sulphur, coal, or charcoal, and a salt of iron, generally green vitriol (protosulphate of iron).

The argil employed in manufacturing artificial ultramarine has the greatest influence upon the color to be produced; and probably in a great many instances failure is to be attributed to the employment of clay of too ferruginous a nature.

I use a white clay which is not colored by fire, and which consequently contains but very little iron. It is a species of kaolin, of a dead color, biting to the tongue, and forming a very short paste with water, and is to be met with in the principality of Reuss, in the environs of Roschitz, being generally used for making porcelain. This clay contains from 42 to 43 per cent. of alumina, and it will readily be conceived that the preference ought to be given to the most aluminous clay.

In the manufactory at Nuremberg, a white terra sigillata (called *bolus alba* in Pharmacy), which comes from Tischeureuth, is employed.

At Nuremberg impure sulphate of soda is employed, which is the residuum from the manufacture of hydrochloric acid, and which may either be refined in the works or purchased in a refined state; this operation, which will be referred to hereafter, is intended principally to separate the free hydrochloric acid and the salts of iron, which would injure and might even entirely destroy the blue color of the ultramarine obtained: roll or stone brimstone is too well known to require any notice.

With regard to the coal or charcoal to be employed, dry wood charcoal appears to be that best adapted to the purpose.

Coal is also employed sometimes, and in that case it is to be chosen dry, rich in carbon, and giving the least possible quantity of white or greyish ash; and non-ferruginous.

The calcination of the mixture is effected in muffles placed in reverberatory furnaces, as it is much easier by this means to regulate the temperature and watch the operation than by using crucibles. They are constructed of refractory fire-clay, in the same manner as glass pots, and may be closed in front by a cast-iron door, which, as well as the bottom, is furnished with a narrow slot for watching the operation, and admitting air. The furnaces are furnished with registers, which allow the temperature to be regulated at pleasure. The duration of the muffles may be increased by supporting them upon three rows of bricks, placed upon the bed of the furnace, and at certain distances apart, in order to allow of the passage of the flame, and thus divide the furnace as it were into two furnaces. When wood charcoal is employed as fuel it may be charged through a door at top, as in assay furnaces.

Besides the muffle furnace, for the conversion of sulphate of soda into sulphate of sodium, a furnace analogous to those employed in the manufacture of soda is employed. In my works, I have substituted for the single lateral fire-place, two smaller ones, placed opposite each other. Experience proves that a considerable saving of time and fuel is effected by this means, especially in furnaces the beds of which are more than 6 feet in length. The construction of these furnaces is so well known that it will be unnecessary to enter into any further details thereupon.

Lastly, the works must contain stampers and mills for pulverizing substances, &c.

We will now proceed to the preparation of the primary substances, and to the manufacture of the artificial ultramarine.

The clay having been broken to pieces with a wooden pestle is put into rectangular vessels six feet long and three feet wide; it is then to be sprinkled with water and left alone for some days, until reduced to a pasty mass, which is purified by levigation and deposition, in the same manner as in porcelain manufactories, in order to separate the sand and the grosser parts. It is afterwards kept in vessels placed under a covered shed in the state of a soft paste, the quantity of dry clay contained in which is to be correctly ascertained each time it is to be used for the preparation of ultramarine.

In order to prepare the sulphate of soda, the residuum from the manufacture of hydrochloric acid is employed, as already mentioned; this is to be calcined in a reverberatory furnace to drive out the free acid contained therein, and is afterwards broken into pieces, and plunged in water for an instant (it having been proved by experience that the free acid is disengaged much more easily from a damp salt than from a dry one); the pieces are then piled upon the bed of the furnace, nearly up to the arch, and arranged in such a manner that the flame may circulate freely over them. The furnace is then gradually heated to a dull red, until all the free acid has been driven off.

The calcined salt is then pulverized, either with a stamper or between stones, into grains of the size of gunpowder, and mixed in a vessel turning on an axis, with coal and slacked lime in the following proportions:—

Sulphate of soda	100 parts.
Powdered charcoal	33 do.
Slacked lime	10 do.

This mixture is introduced on to the bed of the reverberatory furnace, and covered with slacked lime, which is thrown upon it with an iron shovel; the furnace is then closed, and as soon as the mass is in a complete state of fusion, it is briskly stirred by projecting upon it several shovelsfull of powdered coal or charcoal; it is then left quiescent for some time, until no more lighted gas is disengaged from the surface of the bath. The sulphuret of sodium is poured out into flat cast-iron moulds, where it is solidified.

The sulphuret of sodium, mixed with carbonate of soda, is dissolved in boiling water; the solution is then left to clarify and kept from contact with the air in suitable vessels, where it parts with some of the carbonate and a little sulphate of lime; sometimes a little crystallized sulphate of soda, which is calcined and treated as above described, and very fine coal or charcoal, which is not deposited until after some few days. It is very important to leave it quiescent as long as possible, because the least particles of coal are sufficient to change the color of the ultramarine in the fire. This solution, after being decanted, is saturated with powdered sulphur, and concentrated by boiling, until it contains 25 per cent. of dry bisulphuret of sodium; it will then be of a density of about 1·200, and mark 25° of Baumé's aerometer: from 40 to 50 parts of sulphur are employed for 100 parts of simple sulphuret of sodium in a state of fusion.

Having allowed the slight excess of sulphur contained in the sulphuret of sodium to deposit, it is transferred into large glass bottles, which are carefully corked, to keep it from contact with the air, and it is thus kept until it is wanted.

The substances being prepared, the manufacture of the ultramarine is proceeded with; 100 lbs. of the sulphuret of sodium, above mentioned, are evaporated to the consistence of syrup in a flat cast-iron boiler; a quantity of washed clay, still damp, corresponding to 25 lbs. of dry clay, is added, and the whole is mixed as intimately as possible with a strong iron spatula. Whilst the mass is still capable of being easily stirred, a solution of 250 grammes of crystallized sulphate of iron, quite free from copper, is added, and the whole is mixed with the greatest care;

if preferred, the solution of iron may be added first, and the clay afterwards. On the addition of the sulphate of iron, the mixture assumes a yellowish green tint, owing to the formation of sulphuret of iron; it is stirred until evaporated to dryness, and reduced to as fine a powder as possible.

The muffles are charged with a layer of this powder, from two to three inches thick, which corresponds to a weight of from 30 to 40 lbs. for each muffle. The fire is continued until the whole mass attains a red heat, and it is left in this state from three quarters of an hour to an hour,—the surfaces being frequently renewed and free access given to the air. The mass assumes, successively, a yellowish brown, red, green, and finally blue color. This operation requires much attention and practice; if the heat be not sufficiently high, the ultramarine will not be produced, and if too high and too long kept up, the beauty of the tint will be deteriorated.

The charge is now withdrawn from the muffle, and washed with water. This water, which, after washing, contains sulphuret of sodium, sulphate, and sub-sulphate of soda, has not as yet been employed for any purpose; it might, however, be used for the preparation of sulphuret of sodium. The residuum, after washing, is drained in a strainer of very fine texture, and afterwards dried: the color is ordinarily a green or blackish blue. The dried mass is then finely pulverized and sifted through silk, and afterwards calcined in portions of from 10 to 14 lbs. in muffles made especially for the purpose, and which are from 16 to 18 inches wide, and from 30 to 40 inches deep. A moderate fire is kept up, and a gentle red heat suffices to produce the desired color. As soon as the blue color begins to appear, the contents are stirred with an iron rod, until it becomes a fine blue. The operation lasts from half an hour to three quarters of an hour: there is no advantage in prolonging it, or increasing the intensity of the fire. The powder is then taken out of the muffles and allowed to dry in the open air on slabs of granite; and it often happens that, in drying, the color acquires much more fire and beauty.

The ultramarine is then ground between granite stones, about 3 feet in diameter, and afterwards washed and separated into various degrees of fineness, numbered respectively $\frac{0}{0}$, 0, 1, 2, 3, 4, &c.

An excellent test of the quality of ultramarine is to heat it over a spirit lamp, in a glass tube, through which a current of hydrogen is passed. The quality of the ultramarine is in proportion to the length of time the blue color takes to disappear. Natural ultramarine color does not lose its color for one or two hours, and sometimes more; artificial ultramarine of Nuremberg, marked 0, in the space of half an hour; and the most inferior, marked 5, in a few minutes.

ON A NEW PROCESS FOR OBTAINING PURE CHLORINE GAS,—BY PROFS. R. E. ROGERS AND W. B. ROGERS, OF THE UNIVERSITY OF VIRGINIA.

This process is founded on the powerful oxidating action of chromic acid, especially when liberated in a solution, and consists in causing a reaction between hydrochloric acid and this substance, in which the chlorine of the former is set free. Our mode of proceeding is as follows:—To 1 part of powdered bichromate of potassa, in a small retort or flask, we add 6 parts of hydrochloric acid, of specific gravity about 1·16, and apply a gentle lamp-heat for a few seconds, so as to bring about a brisk reaction. The chlorine is now rapidly evolved, and continues to be disengaged as fast as is convenient, without requiring any further application of the lamp.

Referring to the composition of the bichromate of potassa and of hydrochloric acid, it will be seen that *one equivalent of bichromate of potassa and seven of hydrochloric acid are capable of evolving three equivalents of chlorine*, at the same time giving rise to one equivalent of the sesquichloride of chromium, one of the chloride of potassium, and seven of water.

In order to ascertain how near we might approach to the equivalent quantity of chlorine above deduced, we resorted to the following method:—Knowing that a strong solution of chloride of sodium is much less absorbent of the gas than ordinary water, we prepared a quantity of saturated brine, through which we passed chlorine, until the liquid appeared to be fully charged. With this we filled a tall graduated vessel, designed to receive the gas, and a porcelain bowl, which served as a pneumatic trough, and having placed 4 grammes of the bichromate with an excess of hydrochloric acid in a small retort, we passed the gas, as it was evolved, through the chlorous saline solution into the narrow graduated jar. After urging the process until the action entirely ceased, and no further gas escaped, we measured the resulting gas, with the usual precautions, at 60°. Its volume was found to be 54·5 cubic inches. On repeating the experiment with the same amount of bichromate and acid, and with the same brine, we obtained in the second trial 55·5 cubic inches, and in the third 56·2 cubic inches of the gas, the increase being evidently due to the diminished absorption arising from the more complete saturation of the liquid with chlorine.

Taking 76·5 grains as the weight of 100 cubic inches of chlorine, at 60° Fahr., the volume due to the entire decomposition of 4 grammes of bichromate of potassa, is 57·3 cubic inches. It thus appears that, with proper precaution, this process may be made to yield $\frac{56}{57}$ths, or nearly the whole theoretical amount of the gas.—[*From Silliman's Amer. Jour. for May*, 1846.]

ELECTRIC EXCITEMENT OF PAPER, BY THE REV. H. G. O. DWIGHT.

It is well known that friction will excite electricity in a sheet of paper, especially if it be thoroughly dry. This is well shewn by placing the paper on a warm stone, for a moment, when a single passing of the palm of the hand will produce electric excitement. On raising the paper carefully from the stone, sparks may be obtained from different parts of it by the knuckle. If a piece of tin plate be placed on the paper arranged on the stone, and pressed down, on raising the whole carefully, a strong spark is procured; and if it be returned to the stone, and the plate again pressed strongly upon the paper, another spark is given out on again raising it.

If the sheet of paper, with the tin plate mentioned above, be charged as just explained, and then be removed carefully, and placed on a sheet of tinfoil upon the top of an insulated stool, and pressed down with a finger at the centre,—on raising it, a strong spark will be obtained from the tinfoil, and another from the lower surface of the tin plate through the paper. This simple electrical machine may be again charged by returning the paper to the stone, and pressing the tin plate down upon it with the hand.—*Ibid.*

GRADUAL RISE OF NEWFOUNDLAND ABOVE THE SEA.

It is a fact worthy of notice, that the whole of the land in and about the neighbourhood of Conception Bay, very probably the whole island, is rising out of the ocean at a rate which promises, at no very distant day, materially to affect, if not to render useless, many of the best harbours we have now on the coast. At Port-de-Grave a series of observations have been made, which undeniably prove the rapid displacement of the sea-level in the vicinity. Several large flat rocks, over which schooners might pass some thirty or forty years ago with the greatest facility, are now approaching the surface, the water being scarcely navigable for a skiff. At a place called the Cosh, at the head of Bay Roberts, upwards of a mile from the sea-shore, and at several feet above its level, covered with five or six feet of vegetable mould, there is a perfect beach, the stones being rounded, of a moderate size, and in all respects similar to those now found in the adjacent land washes.—[*Newfoundland Times.*]

Scientific Adjudication.

COURT OF COMMON PLEAS.

(Sittings in Banco, May 27, 1846.)

BEARD *v.* EGERTON AND OTHERS.

THE Court this day delivered judgment in this case, which was a demurrer argued last term.

When argued, it appeared that an action had been brought by the plaintiff against the defendants for the infringement of a patent for a mode of taking likenesses, called "the Daguerreotype process."

The declaration alleged that the plaintiff became the assignee or purchaser in this country of a patent taken out in the name of Berry, as agent for M. Daguerre, a Frenchman, residing in France, for the taking of Daguerreotype pictures; which patent, it was alleged, the defendants had infringed. To this there was a number of pleas (some of them of a purely technical nature), and on two of them substantial points of interest were raised. It was, in the first instance, alleged that Daguerre had transferred to his agent all the information he possessed of the invention for the purpose of taking out a patent, and that the plaintiff, as assignee, did not stand in the light of a meritorious inventor; and in a subsequent plea it was alleged that, previous to that assignment, Daguerre had assigned over all his right to the invention to the King of the French, for a certain annuity; and that the King of the French had since made all that information known to the public; and that the defendants had a right to the invention without the leave of the plaintiff: upon which grounds these pleas alleged that the patent was void. To these pleas there was a demurrer that they were not a sufficient answer in law.

Sir T. Wilde, for the plaintiff, submitted that Daguerre himself might have taken out the patent, and it would have been valid, and there was no principle in the common or in the statute law to prevent the same privilege from attaching to his assignee, the plaintiff. On the second point, he submitted that the fact of Daguerre having sold all his right to the invention in France did not affect his right to sell it in this country; that the laws respecting patents in the two countries were distinct and independent; and that, so far as the laws of this country were concerned, Daguerre had a perfect right to assign the patent to whom he pleased, notwithstanding the transfer of his right in France.

Mr. Serjeant Channell, for the defendants, admitted that, in some cases, the importer of an invention was considered as the inventor, yet that there must be some meritorious consideration on the part of the person who took out the patent. In this case, Beard, the plaintiff, stood merely in the position of the agent of Daguerre, and there was nothing meritorious in his introduction of the invention. On the second point, he submitted that Daguerre, by having transferred his right to the King of the French, had denuded himself of all interest in the invention, and was not, therefore, to be looked upon as the importer in the sense in which he would be entitled by the law to take out a patent.

Sir T. Wilde, in reply, contended that, in this last respect, what was done in France had no effect out of France. The exclusive right to the French patent was confined to the French dominions. That being so, could it be said that Daguerre could not come to England and take out a patent here? His right was not diminished all over the world because he had assigned his right in France to the King of the French. He submitted that these pleas were bad, and that the judgment ought to be for the plaintiff.

Lord Chief Justice Tindal.—The Court will take time to consider.

To-day the Court gave judgment. The Court thought it unnecessary to consider the ground of the special demurrer to the fifth plea, because it was bad in substance. The defendant had urged two points: first, that the plaintiff was only a trustee for others; and next, that if he were an importer and introducer of an invention, it was necessary that he should be a meritorious introducer of it—that there should be some merit on his part. But at common law the discoverer of anything new abroad, who introduced it into this country, was in the same position as the inventor; this was clear before the Statute of Monopolies, and the 6th section of that statute was only an affirmance of the common law; and that statute was intended to encourage the introduction of new devices. It was argued that Beard was not a person who had imported within the meaning of the statute, because he was not a "meritorious" importer; but no authority had been cited in support of such a distinction, and, so far as the public were concerned, no such distinction was necessary. Suppose he was guilty of a breach of faith as a trustee, he might or might not be responsible to his employers abroad; but with that question the present defendants had nothing to do. It was clear, from the decision in the case of "Chappell *v.* Purday," reported in 14 Meesom and Welsby, p. 318, that a foreigner might hold a patent in this country, if the Crown might choose to grant it to him. And the Court thought that the letters patent were not made void by what Daguerre might have done in France respecting the invention: that being so, the invention could not be used in this county in direct violation of the grant of the Crown, without the permission of the patentee. For these reasons, the judgment of the Court must be given for the plaintiff.

REPORT OF AMERICAN PATENTS.

From the "Journal of the Franklin Institute."

EDITED BY DR. THOMAS P. JONES.

To WILLIAM H. SCHECUT *and* HORACE H. DAY, *of New York, for an improved mode of preparing adhesive and strengthening plasters of India-rubber.*

THE articles we employ in the preparation of the said plasters, are those known in commerce as caoutchouc or India-rubber, pine-gum (obtained from the southern yellow pine, commonly termed "long leafed" pine), cayenne pepper, balsam of Peru, litharge, and spirits of turpentine.

The proportions are five pounds India-rubber, reduced to fine shreds, steeped in soft water for softening it, then put, with sufficient quantity of spirits of turpentine to cover the India-rubber, in a vessel, the quantity to be increased as the gum soaks it up. When the rubber is sufficiently dissolved it is pressed through a fine sieve. Four ounces of capsicum amnum, or cayenne pepper, is heated in a quart of spirits of turpentine. A portion of this tincture is ground with a pound of litharge, and then mixed with the remnant of the tincture, and to it is added six ounces of the balsam of Peru. Then melt a pound of pine-gum, and add spirits of turpentine until it is thin enough to strain; and, finally, all the preceding preparations are mixed together.

Claim:—"What we claim as our invention, and desire to secure by letters patent, is the combination of the materials in the general proportions above described, for making an adhesive plaster.

"We also claim making plasters porous, or pervious to fluids, by perforating them with numerous minute holes."

To E. WHELAN, *of Philadelphia, Pennsylvania, for an improvement in the drip-cup of lamps.*

THE patentee says,—"My improvement is applicable, and is intended to be applied, to solar lamps which have high conical chimnies or burners, say of twelve inches, more or less. In lamps of this description, it is difficult to regulate the height and intensity of the flame by simply raising or lowering the wick; and this difficulty I have obviated by so constructing the drip-cup as to regulate, with great precision, the supply of air to the interior of the wick. For this purpose I make the upper part of my drip-cup in two pieces, one of which shall swivel or revolve, to a limited extent, on the other, in the manner of circular registers for regulating the draught in stoves, or the admission of heated air into apartments. In each of these pieces there is a series of similar holes, set around in a circle, which may be made to coincide when a full supply of air is to be admitted, and may be closed to any extent required for regulating the draught, there being a check-pin, or stop, to prevent said openings from being entirely closed, as a small portion of air is to be admitted under all circumstances."

"What I claim as new, and desire to secure by letters patent, is the combining with the draught-holes of such a cup, a rotating or other valve or air regulator, which is capable of being nearly, but not entirely, closed, such as is herein described, and substantially in the manner and for the purpose above set forth.

"I do not claim such a valve, or regulator of the draught, as new in itself, but limit my claim to the combination thereof with the drip-cup of a solar lamp."

To GARRETT ERKSON, *of Pittsburgh, Allegheny county, Pennsylvania, for an improvement in propelling boats.*

INSTEAD of the common paddle-wheels now used in propelling boats, the patentee propoes to use two elliptical wheels, flat or convex, put on the shaft, with their longitudinal axes at an angle of about 45 degrees with the line of the shaft.

Claim:—"What I claim as my invention, and desire to secure by letters patent, is the application of an oval wheel, flat or convex, to operate as described in the foregoing specification.

"I do not claim any part of the machinery used in the construction thereof."

To DANIEL BARNUM, *of Bridgeport, Fairfield county, Connecticut, for an improvement in the power loom.*

FOR the purpose of arresting the momentum of the shuttle, there is an extra spring within the shuttle-box, and so attached to the protection guard that when the shuttle strikes the spring and forces it out, it reacts on the protection guard and arrests the shuttle.

The upper ends of the picker staves act directly on the shuttle, instead of the pickers, and to insure their proper position relatively to the shuttle-box, their lower ends are curved like a rocker, and rock on a horizontal platform. The wag staves are connected with the treadles by straps, in the usual manner, and with the picker staves by means of jointed rods; helical springs being employed to draw back the wag staves and keep the treadle straps distended.

Claim:—"What I claim therein as new and desire to secure by letters patent, is the employment of the spring on the inside of the protection guard, in the manner and for the purpose described. I also claim the particular manner of combining the treadles, the wag staves and the picker staves with each other, as herein described and represented, so that they shall co-operate in producing the required motion, as set forth.

"I do not claim as new the manner of forming the picker staves with a rocker on their lower ends; nor do I claim the using them without the ordinary picker, this having been previously done; but limit my claim to the arrangement and combination above named."

To KASSON FRAZER, *of Fayetteville, Onondaga county, New York, for a spring and rectangular tongue buckle.*

THE tongue of this buckle projects at right angles from the end of a jointed arm acted upon by a spring, so that when a hole in the strap is presented, the tongue enters it by the tension of the spring.

Claim:—"What I claim as my invention and desire to secure by letters patent, is the manner in which I construct the tongue of my buckle, substantially as herein described, the tongue being combined with a spring, and so operated on by the same that it enters the holes in the straps in the direction and manner substantially as set forth.

To SILAS HART, *of New Haven, Oswego County, New York, for an improvement in beehives.*

A VERTICAL tube runs up vertically into the hive, and is provided with a bell mouth at the bottom (near the entrance of the hive), and with a drum near the top.

Claim:—"What I claim as my invention and which I desire to secure by letters patent is, the mode herein described of warming the bees in the hive; that is to say, I claim in combination with the hive, the hot air tube in the lower part of the hive, arranged with reference to the entrance as described, its upper part provided with a drum surrounded with wire gauze; the whole arrangement of parts of the said heating apparatus and purpose of the same being as herein described.

To A. SANBURN, *of Sycamore, Hamilton county, Ohio, for an improvement in beehives.*

THE hive is suspended to an appropriate frame, with the lower end downwards, and below this is suspended a platform, on which the bees walk in entering the hive, and this is pierced with two rows of holes, which communicate with the moth trap placed below.

Claim:—"What I claim as original, is the combination of the moth trap or harbour before described, with the suspended hive, constructed and arranged in the manner set forth."

To ELIPHALET S. SCRIPTURE, *of New York City, for an improvement in carriage-wheels.*

THE object of this improvement is to arrange the spokes and hub in such manner as to afford a ready means of tightening the wheel when the spokes become loose by shrinking, which is effected by inclining the spokes either way from the plane of the wheel to form what is termed a double-dished wheel, one half of the spokes being inserted in a permanent hub or cheek piece, and the other half in a moveable hub or cheek-piece, which slides on the pipe-box, so that by means of a nut the moveable hub can be forced with its spokes towards the other, and thus tighten the spokes.

"I do not claim constructing wheels with the spokes bracing by projecting the inner ends out from the plane of the wheels on each side; nor do I claim screwing the ends up firmly against a centre permanent projection on the hub, as that would not effect the object I have in view, which is to continually tighten the spokes and brace them out against the felloes as they wear loose; but what I do claim as my invention and desire to secure by letters patent, is the combination of the pipe-box with the cheek-pieces into which the spokes are inserted, and fastened by plates on their outside, a space between said cheeks being left so that they can be forced towards each other to tighten the spokes as they wear loose, or shrink, and by that means firmly brace the wheel, which can be readily taken to pieces, and any broken or defective parts replaced by perfect ones."

To HOLMES HINCKLEY, *of Boston, Mass., for an improvement in the connecting rods for connecting the crank pins of three or more driving wheels of locomotives.*

THE object of this improvement is to connect three, four, or more, driving wheels with a single connecting rod, and permit those between the two end ones to have a vertical and lateral play, which is effected by having the crank-pins of the intermediate wheels work in boxes that slide vertically in the connecting rods, the said crank pins being made of sufficient length to give end play to the axles.

Claim:—"I claim making the boxes to slide vertically in the connecting rod, in combination with extending or lengthening the crank pins of the wheels beyond the said boxes, so as to slide through them in the direction of their axes, as set forth; the whole being for the purpose of converting all of the several wheels of the engine into drivers, as described."

To GEORGE R. TALLEY, *of Westbrook, Bladen county, for an improved instrument for cutting grooves, or indentations, through the bark and sap of pine trees, to procure turpentine, called the double operating turpentine shave.*

THE following claim expresses the nature of this instrument very clearly.

Claim:—"Having thus fully described the manner in which I construct my double-acting turpentine shave, and pointed out the operation thereof, what I claim therein as new and desire to secure by letters patent, is the connecting of the two gouge-formed shaves, or cutters, with their levers, by means of the double springs, in combination with the concave guide band, by which combination the shaves, or cutters, are moved in a curve the reverse of that described by the ends of the levers from which they derive their motion; and I do hereby declare that I do not intend by this claim to limit myself to the precise form in which the instrument is herein represented and described, but to vary the same as I may find expedient, whilst I attain the same end by means substantially the same."

To JAMES JONES, *of Galway, Saratoga county, for an improvement in the axletrees of wheeled carriages.*

THIS improvement is for a method of securing metallic skeins, or linings, to wooden axles, in such manner as to admit of turning them to change the worn part, for the part which is at the bottom bears the whole weight, and consequently the principal part of the wear. The metallic lining is slipped on to the wooden arm, from the end of which projects an iron screw rod, that passes through a hole in the end of the lining, so that by a nut on the end, the whole can be secured or turned, at any time.

Claim:—"I do not claim to be the inventor of hollow skeins for axle-trees, for these have been heretofore used, and secured permanently to the axletrees by bolts or screws, passing through them into the axletrees; but what I do claim as my invention, and which I desire to secure by letters patent, is the before-described manner of fastening the skeins to the axletree, so that they can be tightened, and turned, and changed in position whenever they become loose or uneven, from the shrinking of the wood and the rubbing of the metallic surfaces, or from any other cause, by means of the aforesaid construction of the axletree and skeins, and arrangement of the screw rods and nuts, used and operated in the manner set forth."

To JOEL G. NORTHRUP, *of Cortlandville, Cortland county, for improvements in the printing press.*

THE patentee says,—"In my press I employ four friskets, which are made to traverse up and down, being governed in their movements by suitable guides, and carried by pinions and ratchets, to be presently described. In their passage, two of them are simultaneously brought opposite to two forms of type situated vertically, between which and two platens they are arrested during the period necessary for taking the impression; the platens being brought up against them by a revolving shaft, furnished with arms, carrying friction rollers, and the impressions are thereby taken; at this time one of the friskets is situated above the platens, and the other below them; that above opening for the delivery of a perfected, and the feeding in of a blank sheet."

Claim:—"I do not claim the using of four friskets as in itself new, but I claim the manner and combination in which I use them, which are necessarily different from any heretofore adopted; and these I claim, whether the form or forms of type be placed vertically or horizontally, and whether two impressions, or one only, be taken at the same time.

"I also claim the manner of combining and arranging the parts by which the power is applied to the platens, through the intermedium of the revolving shaft, which is made to operate intermittingly, and to carry arms that bear upon the backs of the platens, as herein set forth."

To BEN. WEBB, *of Warren, Herkimer county, for an improvement in the self-setting apparatus for saw mills.*

THE lever, by which the log is set, is connected with the slide by an elongated hole playing on a pin, and to this lever is jointed a hand, or pawl, which takes into the teeth of a permanent rack, and to preserve the same inclination of the hand, or pawl, as the lever vibrates with it, there is a roller on the axis of the hand, or pawl, which travels between two rails. The toothed rack is adjustable by a screw, to set the apparatus for the first cut, to avoid the cutting of an imperfect plank at the first operation.

Claim:—"I do not claim setting the head and tail block by means of a rack, pawl, and lever; but what I do claim is the before described combination of the railway and wheel with the sliding bar, hand, and lever, arranged and operated in the manner and for the purpose above set forth.

"I also claim the setting of the reversible cogged bar, by means of which it can be adjusted to the hand when reversed, or shifted, for cutting different thicknesses of boards in the same log, and thus avoid the necessity of spoiling the first board cut after shifting, or turning, the cogged bar, as described."

To Erastus B. Bigelow, *of Boston, Mass., for improvements in power looms, for weaving plaids, ginghams, &c.*

The patentee says—"The nature of my invention consists in the mode of delivering out the warp, of taking up the finished cloth, and measuring it as it is woven. The method of constructing, arranging, and operating the shuttle boxes, arresting the shuttles, and then relieving their points from the pickers; thereby allowing the shuttle boxes to move up and down freely, and the method of stopping the loom when the filling breaks, or is exhausted."

Claim:—"What I claim as my invention and desire to secure by letters patent is:—

1st. The combination of the tension or yarn roller with the letting-off motion, so that when the yarn roller is drawn forward by the process of weaving, the let-off is put in motion, which relieves the yarn roller and allows it to fall back, and thus stop the let-off; and I also claim in combination with the above, the break for preventing the yarn roller from moving, while beating up the cloth.

2nd. In combination with the measuring rollers, I claim the index wheel and hand for measuring the cloth as described.

3d. I claim the combination of the shuttle boxes with the weight, or spring, by means of the chain and pulleys and pin-wheel with which the weight is made to connect to change the pattern, while the machinery is guarded against injury if the shuttle should not be sent home.

4th. I claim in combination with the pickers, the spring lever, arranged and operated as above described, so as to arrest the shuttle as it enters the box, and then to fall back to clear the point of the shuttle, before the box changes.

Lastly. I claim the combination of the apparatus for stopping the loom, that is to say, the combination of the fingered lever with the levers in the manner described, and in combination with the above, the protector and stop on the wheel, to arrest the motion of the crank shaft, and throw off the shipper."

To J. Keller, *assignee of* Daniel Pfister, *of Manedrof, Canton of Zürich, Switzerland, for improvements in the machine for dressing stones.*

The chisels are attached to a plate one behind the other, each in succession projecting a little more; and the plate has a short reciprocating movement, the plate being lifted up, for the return movement, by the rotation of two excentric shafts that operate two lifters on which the plate slides.

Claim:—"I claim first employing several cutting instruments attached to a straight plate, and moving over a space equal to their distance apart, so as only to be in action a small portion of time before they are relieved, substantially as herein set forth;

the cutters each projecting over the one below it the depth of the cut to be made, as above fully made known.

"Secondly, the method of moving the cutters from the stone after every cut, as herein described, by means of the revolving of the vertical shafts, or any other means substantially the same for the purposes herein described."

To THOMAS S. LAMBERT, *Utica, Oneida county, N. Y., for an improvement in the heating apparatus for portable vapour baths.*

IN the pipe which rises from the boiler there is a hollow piston into which are placed the substances from which the medicated vapor is to be produeed, and this answers the double purpose of furnishing the medicated vapor, and as a safety valve to regulate the pressure of the vapor from the boiler.

Claim :—" The first claim is limited to the combination of the hollow piston, with the boiler, for the purpose specified. And the second, to the peculiar arrangement of the burners of the lamp employed to heat the apparatus, but which we do not deem sufficiently important to describe, as it could not be made clear without drawings.

To SARAH P. MATHER, *of Brooklyn, for a submarine telescope for examining objects under the surface of the water.*

A GLASS lamp is attached to the lower end of a tube for the discharge of the gases, and small tubes by the side to supply air to the lamp for combustion. This constitutes the instrument for eluminating objects under water, and the telescope consists of a tube of sufficient length to reach from the surface of the water to any depth required, with an opening at one side of the lower end covered with glass, or a glass tube at the lower end may be substituted therefore. A reflecting mirror is placed at the back of this aperture to reflect any object under water, and two small tubes extend from the lower end to the large tube by the side of the glass tube or window, up to the water surface, to prevent the pressure of water from collapsing the large tube.

Claim :—" Having thus fully described my improvements, what I claim as my invention, and desire to secure by letters patent is, the combination of the lamp, or other light, and tubes, substantially in the manner and for the purpose above described.

" I also claim the telescope herein made known, having glass at its lower end, and a mirror therein, and side pipes attached thereto, the whole being combined and arranged as hereinbefore made known."

To JOEL H. ROSS, *for an improved apparatus for giving hot-air, or vapor baths.*

THE patentee says,—" This apparatus consists of a fountain to contain the combustible fluid to be used, with a burner attached, in which the fluid is to burn: a boiler to contain the water by which the steam is to be generated: a frame which is to be placed around the patient to receive the bath, and a pipe to conduct the vapor and hot air from the boiler to the frame.

Claim:—"What I claim as my invention, and desire to secure by letters patent, is the combination of the boiler with the steam and hot-air pipes, having the communications between them regulated by the valve, the whole being constructed and operated as above described.

"I do not, however, intend to be understood as confining myself to the use of any particular metal, in the construction of my said apparatus, nor to the precise dimensions of the several parts thereof, as above mentioned; these may be changed accordingly as circumstances may require."

To Jos. [illegible], of Syracuse, Onondaga county, for an improvement in the press for pressing cotton, &c.

This press is adapted to the pressing of several bales at one time. A horizontal beam is carried up and down by means of two vertical screws, and operates a series of toggle joints connected with it, each toggle joint being provided with, and operating, two followers, on opposite sides, so that two series of bales, which are carried in on cars, are all pressed at the same time, and when corded up, can be drawn out.

Claim:—"Having thus fully described my improvement in presses, what I claim therein as new is the combination of the series of toggle joints with the beam, in the manner described, so that they can have a lateral motion, without straining the beam."

LIST OF REGISTRATIONS EFFECTED UNDER THE ACT FOR PROTECTING NEW AND ORIGINAL DESIGNS FOR ARTICLES OF UTILITY.

1846.

Apr. 29. *S. Wertheimer & P. Simon*, of 35, Greek-street, Soho, for an improved pamphlet and leaf holder.

May 1. *Alexander Alexander*, of 6, High-street, Exeter, Devon, optician, for a portable levelling staff.

6. *Henry Field*, of Argyle-street, Glasgow, for a wind-guard.

7. *Thomas Empsom*, of 32, King Edward-place, Birmingham, button manufacturer, for the Victoria fastening for ladies' dresses.

Apr. 8. *Chilton & Taverner*, of 135, Old-street, for the back of a sewn-through button.

8. *William Moseley*, of 17, New-street, St. Martin's Lane, for an apparatus for giving motion to a drill.

9. *Edmund George Hummel & Horace Morley Hummel*, of 6, Old Bond-street, for a symmetrical shirt.

9. *W. Palmer*, of Brighton, ironmonger, for a percolator.

12. *Thomas White*, of 24, Cornhill, London, chemist and druggist, for an improved metallic shield for the prevention and cure of sore nipples.

13. *Edward Bird*, of Birmingham, for a lamp.

14. *Edward Bird*, of Birmingham, for a vessel for a lamp.

15. *George David & James Doudney*, of 17, Old Bond-street, in the parish of St. George's Hanover-square, Westminster, tailors, for the configuration and arrangement of a combination of bands or cords as applied to the waists of trousers, breeches, pantaloons, drawers, waistcoats, belts, and stays of every kind, both for gentlemen and ladies, by means of which these garments are enlarged or contracted at pleasure.

16. *Green & Bentley*, of 27, Upper George-street, Bryanstone-square, London, for a chimney protector.

20. *Robert William Methan*, of No. 21, Beresford-terrace, Walworth, for a bonnet preserver.

20. *James Black*, of Brown-street-lane, Edinburgh, machine and press maker, for a machine for cutting paper, pasteboard, &c.

21. *James Taylor*, of the Vinegar Works, Long-lane, Southwark, merchant, for an atmospheric railway valve.

21. *Isaac Churchyard*, of 24, Park-terrace, Regent's Park, for a tooth-brush.

21. *James Alexander Forrest*, of Liverpool, glass manufacturer, for a window ventilator.

21. *John Ingledew*, of Brighton, miller, for angle coupling, to be used in carpentry and cabinet making.

25. *John Wellsted & Thomas Bray*, of 103, St. John's Wood-terrace, St. John's Wood, for an anti-emergent rat-trap.

List of Disclaimers
OF PARTS OF INVENTIONS AND
Amendments
MADE UNDER LORD BROUGHAM'S ACT.

Disclaimer and memorandum of alteration allowed by Her Majesty's Attorney General on the 11th, and filed with the Clerk of the Patents for England on the 13th May, 1846, to the specification of a patent granted to Christopher Nickels, of Guildford-street, Lambeth, caoutchouc manufacturer, dated 24th October, 1836, for improvements in preparing and manufacturing caoutchouc, applicable to various useful purposes.

List of Patents

That have passed the Great Seal of IRELAND, from the 20th April to 19th May, both inclusive.

To Henry Clark, of Redcross-street, Cripplegate, in the city of London, oil-merchant, and George Roberts, of Wells-street, Cripplegate, aforesaid, miner, for improvements in the construction of lamps; and in the preparation of materials to be employed for producing illumination.—Sealed 28th April.

Robert William Sievier, of Henrietta-street, Cavendish-square, in the county of Middlesex, Gent., for certain improvements in looms for weaving, and in the mode or method of producing plain or figured goods or fabrics.—Sealed 2nd May.

Edward Auguste Desirè Guichard, of Rue des Jeuneurs, Paris, in the kingdom of France, for improvements in printing calicoes and other fabrics.—Sealed 2nd May.

William James Cantelo, of Paris-street, North Lambeth, in the county of Surrey, Gent., for improvements in apparatus for hatching eggs and raising the young, and for heating hothouses and other buildings.—Sealed 5th May.

George Howell, of Larkhall-lane, Clapham, in the county of Surrey, Gent., for certain improvements in coating with a metal the surface of articles formed of copper, or copper alloys, or iron, wrought or cast,—being a communication.—Sealed 5th May.

George Wilson, of St. Martin's-court, St. Martin's-lane, in the county of Middlesex, stationer, for improvements in the cutting of paper for the manufacture of envelopes.—Sealed 13th May.

Henry Smith, of Liverpool, engineer, for improvements in the manufacture of wheels for railways and in springs for railway and other carriages, and in axle guards for railway carriages.—Sealed 13th May.

Peter Carmichael, manager for Baxter Brothers, and Co., flax-spinners and linen manufacturers, in Dundee, for improvements in hackling or dressing flax, hemp, and other fibrous substances, and improvements in machinery for rubbing, stretching, and equalizing the breadth of cloth, made from flax, hemp, jute, and other fibrous substances.—Sealed 14th May.

Pierre Armand le Comte de Fontainemoreau, of No. 1, Skinner's-place, Size-lane, in the city of London, for certain improvements in apparatus for raising and supporting vessels and other floating or sunken bodies, and its application for the better preservation of life and property.—Sealed 19th May.

John Robert Johnson, of Alfred-place, Blackfriars, in the county of Surrey, chemist, for certain improvements in purifying gas, and in the treatment of products of gas-works.—Sealed 19th May.

List of Patents

Granted for SCOTLAND, subsequent to April 22nd, 1846.

To William Eccles, of Blackburn, power-loom manufacturer, William Crook, of Levesy, hand-loom weaver, and William Lancaster, of Blackburn, power-loom weaver, for certain improvements in looms for weaving.—Sealed 24th April.

John Barsham, of Long Melford, Suffolk, manufacturer of bitumen, for improvements in the manufacture of mattresses, cushions, brushes, and brooms, and in machinery for preparing certain materials applicable to such purposes.—Sealed 27th April.

John Nott, of the city of Cork, for certain improvements in the means of communicating intelligence from one place to another.—Sealed 29th April.

William Price Struve, of Swansea, civil engineer, for improvements in ventilating mines.—Sealed 29th April.

Julian Van Oost, of Gendbrugge, near Ghent, but now of Osnaburgh-street, Regent's-park, London, for improvements in treating seed, and in preparing materials used for fertilizing land, and for aiding vegetation.—Sealed 29th April.

George Hinton Bovill, of Millwall, and Robert Griffiths, of Havre, France, engineers, for improvements in apparatus applicable to the working of atmospheric and other railways, canals, and mines; and improvements in transmitting gas for the purpose of lighting railways and other places.—Sealed 29th April.

Peter Carmichael, manager for Baxter Brothers, and Company, flax spinners and linen manufacturers, Dundee, for improvements in hackling or dressing flax, hemp, and other fibrous substances, and improvements in machinery for rubbing, stretching, and equalizing the breadth of cloth made from flax, hemp, jute, and other fibrous substances.—Sealed 6th May.

John Lloyd Bullock, of Conduit-street, Hanover-square, London, chemist, for improvements in the manufacture of quinine,—being a foreign communication.—Sealed 6th May.

John Blyth, of St. Ann's, Limehouse, Middlesex, for an improved mode of closing the orifice of bottles, or other vessels, applicable to inkholders.—Sealed 7th May.

Samuel Cunliffe Lister, of Maningham, near Bradford, for improvements in carding and combing wool.—Sealed 11th May.

Alexander Parkes, of Birmingham, artist, for improvements in the preparation of certain vegetable and animal substances, and in certain combinations of the same substances, alone or with other matters.—Sealed 11th May.

Pierre Armand le Comte de Fontainemoreau, of New Broad-street, London, for an improved mode of constructing certain parts of the harness of horses and other beasts of burden,—being a foreign communication.—Sealed 11th May.

Thomas Hancock, of Stoke Newington, in the county of Middlesex, for improvements in the manufacturing and treating of articles made of caoutchouc, either alone, or in combination with other substances, and in the means used or employed in their manufacture.—Sealed 12th May.

William Garnett Tayler, of Halliwell, Lancashire, cotton spinner, and William Tayler, of Halliwell, labourer, for improvements in consuming smoke and economizing fuel.—Sealed 13th May.

Frederick Harlow, of Paradise-street, Rotherhithe, Surrey, carpenter, for improvements in atmospheric railways.—Sealed 20th May.

Jean Joseph Ernest Barruel, of Rue St. Jacques, in the city of Paris, France, chemist, for improvements in working of certain sulphurets to transform them into metal or oxides, and to collect the latter; also to collect the oxides from oxidized ores equivalent to these sulphurets.—Sealed 20th May.

New Patents

SEALED IN ENGLAND.

1846.

William Edward Newton, of the Office for Patents, 66, Chancery-lane, in the county of Middlesex, civil engineer, for certain improvements in clocks or time-keepers,—being a communication. Sealed 25th April—6 months for inrolment.

Samuel Pickford, of Stockport, in the county of Chester, glass dealer, for certain improved apparatus applicable to casks or vessels for preserving ale and other fermented liquors, and also for raising or forcing the same for draught. Sealed 28th April—6 months for inrolment.

Isaac Henry Robert Mott, of No. 76, Strand, piano-forte maker, for certain improvements in musical instruments, whereby they are rendered more durable, much more capable of resisting the injurious and destructive effects of the atmosphere (especially of extreme climates), and whereby the quality of their tone is greatly improved, and remains good for a much longer period. Sealed 28th April—6 months for inrolment.

William Higgs, of Westminster, chemist, for the means of collecting the contents of sewers and drains in cities, towns, and villages; and for treating chemically the same; and applying such contents, when so treated, to agricultural and other useful purposes. Sealed 28th April—6 months for inrolment.

Anthony Nathan de Rothschild, of London, merchant, for improvements in heating apartments and buildings,—being a communication. Sealed 28th April—6 months for inrolment.

William Mather, of Salford, near Manchester, and Colin Mather, of the same place, millwrights, for improvements in metallic pistons. Sealed 28th April—6 months for inrolment.

Charles de Bergue, of Arthur-street West, engineer, for improvements in atmospheric railways. Sealed 28th April—6 months for inrolment.

James Timmins Chance, of Handsworth, glass manufacturer, and Henry Badger, of West Bromwich, glass stainer, for improvements in the manufacture of glass. Sealed 28th April—6 months for inrolment.

Joseph Douglass, of the borough and county of Newcastle-upon-Tyne, rope maker, for improvements in the manufacture of yarn, twine, and cordage. Sealed 30th April—6 months for inrolment.

Joseph Touche, of Rue St. Antoine, Paris, mechanist, for improvements in lamps. Sealed 30th April—6 months for inrolment.

Edward Augustin King, of Warwick-street, Charing-cross, Gent., for improvements in the production of magnetic electricity,—being a communication. Sealed 30th April—6 months for inrolment.

Thomas Lambert, of New Cut, Blackfriars, brass-founder, and Charles William Rowley Richards, of Charlotte-street, Blackfriars, engineer, for improvements in cocks for drawing off liquids and gases. Sealed 30th April—6 months for inrolment.

John Mercer, of Oakenshaw, Clayton-le-Moors, in the county of Lancaster, chemist, for certain improvements in scouring and clearing wool and woollen fabrics, also in bleaching and clearing silk, cotton, and linen, and other fabrics. Sealed 2nd May—6 months for inrolment.

George Palliser, of Finsbury-place, in the county of Middlesex, carriage-maker, for improvements in the construction of outside seats of carriages. Sealed 5th May—6 months for inrolment.

William Longshaw, of Manchester, cotton spinner, for certain improvements in machinery or apparatus for spinning and doubling cotton and other fibrous substances. Sealed 5th May—6 months for inrolment.

Peter Carmichael, manager for Baxter Brothers, and Co., flax-spinners, for improvements in hackling or dressing flax, hemp, and other fibrous substances, and improvements in machinery for rubbing, stretching, and equalizing the breadth of cloth, made from flax, hemp, jute, and other fibrous substances. Sealed 5th May—6 months for inrolment.

To George Riddett, of Ryde, Isle of Wight, upholsterer, for improvements in reading tables. Sealed 5th May—6 months for inrolment.

John Carter, of Fleur-de-lis-street, in the city of London, ivory merchant, for improvements in paddle-wheels. Sealed 5th May—6 months for inrolment.

Alfred Vincent Newton, of the Office for Patents, 66, Chancery-lane, Middlesex, mechanical draughtsman, for certain improvements in machinery for manufacturing screws,—being a communication. Sealed 5th May—6 months for inrolment.

William Church, of Birmingham, civil engineer, for his invention of certain improvements in machinery to be used in making candlestick-pans, and various other articles which are usually produced wholly, or in part, by means of the process called stamping; and also in machinery for making sockets or tubes for candlesticks, and tubes or tubular articles, applicable to various other purposes. Sealed 5th May—6 months for inrolment.

William Pidding, of Wigmore-street, in the county of Middlesex, for an improved process for preserving the flavour of coffee and cocoa, or of any preparations thereof, from the effects of the atmosphere, Sealed 5th May—6 months for inrolment.

Thomas Melling, of the firm of Melling & Company, of Rainhill, Lancashire, for certain improvements in steam-engines, marine, stationary, and locomotive, and in machinery and apparatus connected therewith; parts of which are also applicable to regulating the flow of fluids generally. Sealed 7th May—6 months for inrolment.

Edward Shephard, of Trafalgar-square, in the county of Middlesex, Gent., for certain improvements in gates, doors, shutters, windows, and other articles of the like construction; and in fastenings to be attached thereto. Sealed 7th May—6 months for inrolment.

Mark Rollinson, of Brierly Hill, near Dudley, for certain improvements in steam-engines. Sealed 7th May—6 months for inrolment.

Robert William Sievier, of Upper Holloway, for improvements in printing. Sealed 12th May—6 months for inrolment.

William Little, of 198, Strand, publisher of the "Illustrated London News," for improvements in machinery for printing. Sealed 12th May—6 months for inrolment.

John Lloyd Bullock, of Conduit-street, Hanover-square, chemist, for improvements in the manufacture of quinine,—being a communication. Sealed 12th May—6 months for inrolment.

Christopher Vaux, of Frederick-street, London, Gent., for improvements in apparatus employed when transmitting and drawing beer and ale. Sealed 12th May—6 months for inrolment.

Alexander Angus Croll, of Suffolk-street, Clerkenwell, for improvements in gas-meters. Sealed 13th May—6 months for inrolment.

Julius Jeffreys, of Norfolk-crescent, Hyde Park, Gent., for improvements in steam-engine boilers and furnaces, and improvements in propelling vessels. Sealed 13th May—6 months for inrolment.

Charles Hancock, of Grosvenor-place, Gent., for certain improvements in the manufacture of gutta-percha, and its application alone and in combination with other substances. Sealed 15th May—6 months for inrolment.

Valentine Bartlett, of Sheffield, in the county of York, dentist, for improvements in artificial palates, teeth, and gums; and certain machinery employed in the manufacture thereof. Sealed 15th May—6 months for inrolment.

William Rodger, of Shamfield-street, Chelsea, Lieutenant R. N., for improvements in anchors. Sealed 18th May—6 months for inrolment.

George Duncan, engineer, for an improved method of making comfits, confectionary, lozenges, and all description of pan goods; the machinery and apparatus for the manufacture of the same; or for any other article to which the said apparatus or machinery may be made applicable. Sealed 19th May—6 months for inrolment.

Stephen Perry, of Woodland-place, St. John's Wood, Gent., for his invention of certain improvements in the manufacture of rings, straps, bands, and bandages, cords, and string; and in their application to clock-work, to locks, and other fastenings, to presses, to books, to paper-holders, to candle lamps, to window sashes, to doors, to window blinds, to seats, and surfaces for lying and reclining upon. Sealed 19th May—6 months for inrolment.

Alfred Markwick, of Langham-place, surgeon, for improvements in the manufacture of epithems, used for medical and surgical purposes,—being a communication. Sealed 20th May—6 months for inrolment.

Zachariah Major Parkes, of Peckham, surveyor, for improvements in the manufacture of coffins for the dead. Sealed 22nd May —6 months for inrolment.

Charles Thomas Lutwyche, of Birmingham, gold and silver chain maker, for improvements in the manufacture of porcelain buttons. Sealed 22nd May—6 months for inrolment.

Hugh Greaves, of Hulme, in the parish of Manchester, engineer, for improvements in the construction of railways, and in the carriages to be used thereon. Sealed 22nd May—6 months for inrolment.

Charles Wright, of Southampton-row, Russell-square, boot maker, for certain improvements in the manufacture of boots and shoes. Sealed 22nd May—2 months for inrolment.

Charles Bertram, of Gateshead, Durham, Esq., for certain improvements in the manufacture of artificial fuel, and in the application of the residual products to useful purposes. Sealed 26th May—6 months for inrolment.

James Montgomery, of Salisbury-street, Middlesex, for certain improvements in the construction of steam-boilers and steam-engines, and in steam-vessels, and the machinery for propelling the same. Sealed 26th May—6 months for inrolment.

Edward Alfred Cowper, of Smethwick, near Birmingham, engineer, for improvements in the manufacture of railway chairs. Sealed 26th May—6 months for inrolment.

Timothy Kenrick, of West Bromwich, in the county of Stafford, iron-founder, for improvements in glazing and enamelling the surfaces of cast-iron. Sealed 26th May—6 months for inrolment.

William Mayo, of Silver-street, in the city of London, manufacturer of mineral waters, for improvements in the manufacture of aerated liquids, and in bottling aerated and other liquids. Sealed 26th May—6 months for inrolment.

John Walker Wilkins, of Stanhope-street, Hampstead-road, Middlesex, for certain improvements in water-closets. Sealed 26th May—6 months for inrolment.

CELESTIAL PHENOMENA FOR JUNE, 1846.

D.	H.	M.	
1			Clock after the ☉ 2m. 33s.
			☽ rises 11h. 2m. M.
			☽ passes mer. 5h. 43m. A.
			☽ sets Morn.
2	5	30	☽ in □ or first quarter
2	13	2	♀ in Aphelion
5			Clock after the sun, 1m. 55s.
—			☽ rises 3h. 26m. M.
—			☽ passes mer. 8h. 41m. A.
—			☽ sets 1h. 21m. M.
—			Occul. ο Virginis, im. 9h. 28m.
	12	3	☿ in conj. with ♃ diff. of dec. 41. S.
9	3	36	Ecliptic oppo. or ○ full moon.
10			Clock after the sun, 0m. 59s.
—			☽ rises 8h. 56m. M.
—			☽ passes mer. 0h. 21m. M.
—			☽ sets 4h. 43m. M.
11	12	38	♄ stationary
	13		☽ in Perigee
13	5	52	☿ in the ascending node
—			Occul. c1 Capricorni, im. 13h. 17m. em. 13h. 52m.
14			Mercury R. A. 4h. 57m. dec. 22. 48. N.
—			Venus R. A. 2h. 33m. dec. 12. 28. N.
—			Mars R. A. 7h. 34m. dec. 22. 56. N.
—			Vesta R. A. 7h. 8m. dec 23. 33. N.
—			Juno R. A. 14h. 25m. dec. 0. 28. N.
—			Pallas R. A. 0h. 25m. dec. 5. 5. N.
—			Ceres R. A. 2h. 36m. dec. 7. 43. N.
—			Jupiter R. A. 3h. 54m. dec. 19. 35. N.
—			Saturn R. A. 22h. 13m. dec. 12. 31. S.
—			Georg. R. A. 0h. 51m. dec. 4. 48. N.
—			Mercury passes mer. 23h. 33m.
14	—		Venus passes mer. 21h. 3m.
	—		Mars passes mer. 2h. 4m.
	—		Jupiter passes mer. 22h. 22m.
	—		Saturn passes mer. 16h. 41m.
	—		Georg. passes mer. 19. 19.
	6	2	♄ in conj. with ☽ diff. of dec. 6. 26. S.
15			Clock before the sun, 0m. 2s.
	—		☽ rises 11h. 49m. A.
	—		☽ passes mer. 5h. 6m. M.
	—		☽ sets 11h. 1m. M.
15	2	9	♀ in conj. with Ceres, diff. of dec. 5. 0. S.
16	6	38	☽ in □ or last quarter
17	6	3	♅ in conj. with the ☽ diff. of dec. 2. 54. S.
	19	25	☿ in Perihelion
19	15	43	♀ in conj. with the ☽ diff. of dec. 1. 33. S.
20			☿ in super. conj. with the ☉
	—		Clock before the sun 1m. 6s.
	—		☽ rises 1h. 42m. M.
	—		☽ passes mer. 9h. 17m. M.
	—		☽ sets 5h. 2m. A.
	20	25	♃ in conj. with the ☽ diff. of dec. 1. 31. N.
21	8	32	☉ enters Cancer,—Summer commences
22	14	27	♃'s first sat. will im.
23	5	48	Ecliptic conj. or ● new moon
23	15	55	☿ in conj. with the ☽ diff. of dec. 5. 59. N.
	15	40	♃'s third sat. will em.
25	8	9	♀ greatest hel. lat. S.
	13	59	♂ in conj. with the ☽ diff. of dec. 6. 24. N.
			Clock before the ☉ 2m. 11s.
	—		☽ rises 5h. 43m. M.
	—		☽ passes mer. 1h. 26m. A.
	—		☽ sets 9h. 1m. A.
27	8		☽ in Apogee
28	3	15	☿ greatest hel. lat. N.
30	14	17	Juno stationary
	20	45	☉ in Apogee

The Satellites are not visible until the 12th day of this Month, Jupiter being too near the Sun.

J. LEWTHWAITE, Rotherhithe.

THE

LONDON JOURNAL,

AND

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CONJOINED SERIES.

No. CLXXV.

RECENT PATENTS.

To Joseph Orsi, *of Pimlico, in the county of Middlesex, Gent., for improvements in sleepers and blocks for supporting rails of railways.*—[Sealed 23rd October, 1845.]

These improvements in sleepers and blocks, for supporting the rails of railways, consist in forming the sleepers of metal, imbedded in cement or other plastic material; which cement, on becoming hard, will protect the metallic parts of the sleepers from the corrosive effects of damp in the atmosphere, and form blocks presenting broad bases, capable of affording solid and rigid supports for the chairs of the rails intended to be mounted thereon.

The manner of constructing these sleepers or blocks will be seen by reference to Plate XVI., in which fig. 1, represents a transverse section of a pair of rails *a, a,* fixed in their chairs *b, b,* by the ordinary means of wedges *c, c;* the chairs being firmly held in their positions, at the desired distance apart, by a tension-rod or bar *d, d, d,* passed through lugs or ears *e, e,* at the under parts of the chairs, and made fast by wedge-pins *f, f.* Fig. 2, represents a longitudinal or side view of one of the rails so mounted.

This invention does not embrace any novelty in the forms of the rails, or in the modes of fastening the rails into the chairs; but it applies to the chairs themselves, in which ears or lugs *e, e,* are formed, at their under part, for the reception of the transverse rods or tension-bars *d, d,* by which the chairs are to be firmly held in their proper position, according to the width or gauge of the railway.

Fig. 3, is a perspective view of one of the chairs detached, shewing the lugs or ears *e, e,* below, with the mortice-holes formed in them for the reception of the tension-bar or rod *d.* The bar *d,* represented in figs. 1, and 2, is made of cast or wrought-iron, about three inches broad on the perpendicular face, and about half an inch thick, extending about a foot and a half beyond the chairs on each side; but the patentee does not confine himself to the precise form or dimensions of tension-rod or bar, as other forms and dimensions might be made to effect the purpose; the slot in each ear of the chair being made to correspond with the sectional figure of the tension-bar.

In order to prepare the improved sleepers or blocks for the reception of the rails of railways, two of the chairs *b, b,* are first placed upon a bar *d,* by passing the bar through the slots in the ears or lugs *e, e,* of the chairs, as represented in fig. 1; and the chairs are fixed upon the bar, at the desired distance apart, by the wedge-pins *f, f,* as there shewn. The next proceeding is to cover or enclose the bar and the ears or lugs of the chairs, so fastened together, with a bituminous or other cement, as asphalte, and thereby form a solid block, nearly of a wedge-shape, broad at the base, with the chairs standing out at top. The mode which the patentee has found most eligible to form these blocks is as follows:—A long metal trough, of nearly a wedge-shape in its transverse section, is provided, the open broad part being upwards. In this trough two openings are made through its bottom, to allow the upper portions of the chairs to protrude, yet fitting the apertures closely. Fig. 4, is a longitudinal section of such a trough *g, g, g,* in which the bar *d,* with its chairs *b, b,* fixed upon it (as before described), is placed in an inverted position; the upper parts of the chairs protruding through the apertures at *h, h h,* below. Fig. 5, is a transverse section of the trough, shewing the bar *d,* lying in it, and one of the chairs *b,* the top part of which hangs down below, through the bottom of the trough. When the bar, with the chairs thus attached, is laid along the bottom of the trough, as represented, a quantity of melted asphalte, or other plastic cement, is put into the trough, so as to completely surround the bar *d,* and the ears or lugs *e, e*; and the trough being filled up to its brim with the cement, the bar and lugs are thereby enclosed and imbedded in the cement, which, on cooling or becoming hard, forms a solid and rigid block, capable of effectually protecting the metal within from the action of the atmosphere or wet, which otherwise might corrode the metal; and also constitutes a broad bearing surface as a sleeper for supporting the rails.

A portion of one of the sleepers or blocks, so formed of cement, with the bar and lower part of the chair within it, is shewn in the longitudinal elevation, fig. 6, and in the transverse section, fig. 7. The blocks or sleepers are preferred to be of a wedge-form, about five inches high, of such length as circumstances may require, and about ten inches wide at bottom, which will afford a solid base for them to be laid firmly on the ground, to support the rails of a railway. The patentee does not intend to confine himself to any precise form or dimensions, nor does he limit himself to the use of any particular kind of cement of which the blocks shall be made, but employs, in preference, such as contains tar, mixed with a large portion of earthy matters, and this he introduces into the mould, or otherwise uses it in a hot state.

Such sleepers or blocks, formed of cement, carrying the chairs so braced together, are intended to be placed, at suitable distances apart, transversely along the line of the intended railway; and when they are firmly secured to the ground, the rails are fixed in the chairs in the ordinary way, as before described.

The patentee observes, that he has found, under some circumstances, a slip of wood might be advantageously placed in contact with each side of the bar *d*, between the chairs, and that such slips of wood, being cemented with the bar into the sleepers or blocks, would tend to strengthen and give rigidity to the sleeper or block, and prevent, in some degree, the vibration which might otherwise take place on the passing of carriages over the rails, and cause the cement to break away from the metal. In order to prevent the edges of the cement of the sleepers or blocks from being broken off by the workmen when fixing them upon the ground, it is desirable to guard their edges by the insertion of bent strips of sheet-iron at those parts of the sleepers or blocks most exposed to injury; this is effected by introducing the bent strips of iron into the trough in which the block is cast, by which means they are imbedded into the edges of the cement, as shewn at *i*, *i*, in figs. 6, and 7.

In constructing the improved sleepers and blocks for supporting the rails of railways, the patentee does not, in all cases, employ chairs with ears or lugs, as represented at fig. 3; but he forms the sleepers by means of wooden blocks, connected together by transverse tension-bars or rods of iron, and encloses these rods and blocks in cement, leaving the wood exposed at top for the purpose of fastening down ordinary chairs thereon, by means of screws or nails, inserted perpendicularly into the wooden blocks: a perspective view of this construction of sleeper is shewn at fig. 8.

The chairs for supporting the rails of railways are sometimes affixed to detached blocks of cement, and every two of such blocks are connected together by means of transverse rods. Fig. 9, represents one of these detached blocks in perspective. The iron chair, in this case, is cast with a flange or wings at its base, shewn by dots, which flange or wings are cemented into the block of asphalte or other material, and the end of the transverse tension-rod is to be attached to the chair by a joint-pin, as shewn. When two of these blocks are thus connected by a transverse rod, the chairs will be prevented from moving laterally.

In the event of longitudinal sleepers being employed for supporting the rails of railways, as is the case on the Great Western line, where the rails are fastened down upon the sleepers without chairs, the improved sleepers are formed in the manner represented in the transverse section of a sleeper-block and rail, at fig. 10. *a*, is a bar or rod of iron, say three inches deep, and half an inch thick, placed between two thick planks or blocks of wood *b*, *b*, which are confined together by screws or bolts *c*, passed through the wood, and secured by nuts at the outside. The wood and iron, so combined, are then covered with cement *d*, *d*, in the way shewn.

These sleeper-blocks may be made of any length that convenience or circumstances shall dictate, and they may be connected together, longitudinally, by mortices and tenons, cut in the ends of the blocks, so as to lock into each other.

The patentee claims, Firstly,—constructing the sleepers of bars or rods of metal, which are passed through the under part of the railway-chairs, and are imbedded in cement, so as to form blocks, having broad surfaces at bottom; and also the peculiar construction of chair for embracing or holding the bars or rods, as above described and shewn in the drawing. Secondly,—imbedding in cement blocks of wood braced by transverse tension-rods, so as to form sleepers, upon which ordinary chairs for railways may be fixed by bolts, screws, or nails. Thirdly,—fixing chairs for railways in blocks of cement, to form sleepers, by imbedding projections or wings at the lower parts of such chairs in the plastic material, and connecting two such blocks or sleepers together by transverse rods, attached to the metal chairs. And, Lastly,—constructing longitudinal sleepers for railways by means of stout planks of wood, combined with iron bars or rods, placed side by side, and embedded in cement, so as to form a continuous block, upon which the rails of railways may be fastened down, without employing chairs.—[*Inrolled in the Petty Bag Office, April*, 1846.]

Specification drawn by Messrs. Newton and Son.

To **John Robert Johnson,** *of Alfred-place, Blackfriars, in the county of Surrey, chemist, for improvements in the materials employed in constructing and working atmospheric railways.*—[Sealed 6th December, 1845.]

The first part of this invention refers to the manufacture of new compositions for sealing the valve and closing the joints of the tubes used on atmospheric railways. The compositions hitherto employed for this purpose do not retain their proper consistence under varying temperatures, and, from the large proportion of bees' wax they contain, are expensive. To produce compositions without these disadvantages, the patentee adds to various mixtures of oily, resinous, and bituminous substances (too soft to be used alone), such a quantity of clay, chalk, or ochre, dry and in powder, as will bring the mixture to the proper consistence, which, from the infusibility of the earthy matter, will be but slightly or not at all affected by changes of temperature. All substances that do not act chemically upon the oily, resinous, or bituminous mixture, and are infusible within the range of atmospheric temperatures, and insoluble in water, may be used; but China clay or whiting is preferred: a mixture, composed of 1 part palm oil, 2 parts brown resin, and 4 parts China clay, in fine powder, answers well.

The above object may also be effected by mixing the insoluble soaps (prepared by the combination of fats and an oxide or earth) with the oily or resinous substances.

The patentee claims, under this head of his invention, the use of argillaceous, calcareous, or other infusible and insoluble matters, in combination with oleaginous, resinous, and bituminous substances, for the purpose of preparing a composition for sealing the valve and joints of tubes of atmospheric railways requiring such material; also the use of the insoluble soaps, when mixed with oily or resinous substances, for the sealing of the longitudinal valves of atmospheric railways.

The second improvement consists in the production of compositions for lubricating the interior of the traction-tubes employed on atmospheric railways. The patentee incorporates with a mixture of fat or oil, and resin or pitch, a sufficient quantity of the earthy matters, before mentioned, to bring that mixture to the required consistence. The following proportions will produce a useful composition:—7 parts resin, 4 parts stearine, 4 parts tallow, and 12 parts clay.

The feature of novelty claimed under this improvement is, the use of argillaceous, calcareous, or other infusible and insoluble matters, in combination with fatty, resinous, or bituminous substances, for the purpose of producing a material fit for lining or lubricating the interior of the traction-tubes of atmospheric railways.

The third improvement consists in treating fabrics with elastic varnish, in such a manner that they will be impervious to air and moisture, and suitable to be used instead of leather for making the longitudinal valve of atmospheric railways. The fabric is composed of cotton, flax, hemp, or wool, and is woven or felted in the form of a belt or strap, of the required breadth and thickness for the valve; or it may be formed in a large piece, and afterwards cut up into strips. The varnish to be applied to the fabric must be of such a nature that, when dry, oils or fats will not act upon it; and it must also possess sufficient elasticity to bear the bending to which it may be subjected when in use. For this purpose the drying oils, such as linseed or nut-oil, may be employed, as they possess these properties. Boiled linseed oil is preferred by the patentee, and it is caused to penetrate the fibres of the fabric in the following manner:—The oil is heated to 250° Fahr., and the fabric is immersed and retained therein until the air and vapour contained in its interstices have been expelled. The fabric is then passed between a pair of iron rollers, to express the greater part of the oil; after which, it is placed in a warm room, to dry gradually; when dry, it is again passed through oil (now heated only to 200°), then between the rollers, and again dried. These operations are repeated until the interstices of the fabric become filled by the successive coats of varnish, and the fibres are cemented together into one mass; the inequalities of the surface may then be removed, by friction with pumice-stone, and a last coat of the varnish applied with a brush.

The patentee claims the treatment of fabrics by means of elastic varnish, of such a nature that, when oxidized or dried, it is unacted on by fatty bodies, and in such a manner that the interior and exterior fibres are cemented with the said varnish, and by which the fibres are rendered impermeable to air and moisture, and thereby fitted for use as a substitute for leather for the longitudinal valve of atmospheric railways.

The last part of this invention embraces new materials for, and new modes of constructing the traction and connecting pipes of atmospheric railways. The new materials are calcareous cements, such as Roman cement, Keene's cement, and the like, which can be cast into the desired form, and require no burning. The cement may be mixed or "gauged" with sand or fine gravel, and rammed into moulds of a suitable shape for producing the pipes. The patentee prefers to form the pipes by means of the apparatus shewn in Plate XVIII., and in the following manner:—Fig. 1, represents a vertical section of an arrangement of apparatus to be used with cements which "set" slowly; and fig. 2, is a vertical section of the apparatus for cements which set quickly: the same letters of reference are used for similar parts in both figures. *a*, is a cylindrical case, resting upon a foundation *b*, and formed with a flange at each end, to which the ends *c*, *d*, are to be bolted; *e*, is a hollow core for forming the inside of the pipe. The interior of the case is first thinly coated with stiff tallow; then a hollow core for shaping that part of the pipe which is to receive the longitudinal valve (marked *z*, *z*, in the transverse section of the pipe, fig. 3,) is fixed in the case *a*, the end *d*, is bolted on, and the core *e*, inserted; and after this has been done, the space between the core and the side of the case is filled with well-washed gravel, from which the superfluous water has been just drained, and which should be previously screened, so that the largest pieces may not exceed an inch in size, and the smallest be not less than one-quarter of an inch. If the cement employed takes some hours to set or become solid (as is the case with Keene's cement), a pipe *f*, is attached to the lower part of the mould, and connected, at its upper end, with the vessel *g*, which is provided with an agitator *h*, for mixing the cement with water; after the cement has been properly mixed with water in the vessel *g*, the cock *i*, is opened, and it is allowed to descend through the pipe *f*, and rise through the gravel in the mould, and force the air before it. When the cement has risen to the top of the mould, the cock *i*, is shut, the pipe from the vessel *g*, is disconnected, the end *c*, is fixed on, and the mould is inverted, in order to admit of the cock *i*, being removed, to prevent the cement from setting within it; and as soon as the cement has set, the core *e*, is withdrawn; but the tube is allowed to become hard and dry before it is removed from the mould. If the cement is of that class which sets rapidly (such as Roman cement,) the mould is filled, as before, with gravel, but a pipe *j*, from an air-pump, is attached to the lower part of the mould, and the upper end of the mould is connected with the vessel *g*, containing the agitator, by a branched pipe *k*, furnished with a cock *l*; at the commencement of the operation, the cock *l*, is closed, and the cock *m*, on the pipe *j*, being opened, a vacuum is produced in the mould by means of the air-pump; the cock *m*, being then closed, and the cock *l*, opened, the cement descends into the spaces from which the air has been withdrawn; and when this has taken place, the pipe *k*, cock *l*, and vessel *g*, are immediately removed and cleaned, to prevent them from being closed by the cement; and as soon as the cement has solidified and become dry, it is removed from the mould. When the tubes are dry and somewhat seasoned, they are rendered impervious to air and moisture, by causing them to absorb coal-tar, which has had its more volatile portions separated by distillation.

Parts of the tubes may be formed with additions of cast or wrought iron, as at *n*, *n*, in the transverse section, fig. 4, by coating the pieces of metal with pitch or other adhesive substance, and then placing them in the mould, and casting the tube in the same manner as before. The hollow parts of the pieces of metal are perfectly closed by the cement, and the film or layer of pitch or other material causes adherence, while it admits of expansion or contraction of the different substances.

Under this part of the invention, the patentee claims the forming of traction and connecting tubes of atmospheric railways by moulds, and casting them of cements which do not require after-burning, and rendering the materials impervious to air, as above described.—[*Inrolled in the Inrolment Office, June,* 1846.]

To James Webster Hale, *of Fitzroy-square, in the county of Middlesex, Gent., for improvements in machinery for cleaning or freeing wool and certain other fibrous materials of burrs and other extraneous substances,—being a communication.*—[Sealed 16th October, 1845.]

This invention relates to an improved combination of mechanical means for picking, ginning, and carding wool, hemp, or cotton; and consists in separating burrs, seeds, leaves, twigs, or other foreign substances, from the fibrous materials, by an arrangement of machinery, acting either alone or in combination with the ordinary carding-machine; and, when so combined, also acting in place of the tumblers usually employed with the carding-machine; or, when used separately, acting as a gin with the common whipper-in, or any other convenient means of removing the clean material.

In Plate XVI., fig. 1, is a side view of a machine, constructed according to this invention. *a,* is the main framing, at one end of which is an endless apron *b,* stretched over two rollers c, c^1; and *d,* is a feeding-roller, the surface of which is composed of a number of rings, formed with teeth on their outer edges. The roller *d,* receives the wool or cotton, with the dirt, burrs, or seed upon it, from the apron *b,* and carries it forward, between its periphery and the grating *f,* to the cylinder *e.* This cylinder is composed of wood, tin, iron, or other material, with a series of alternate steel and pasteboard rings, slipped on to and covering its periphery (the roller *d,* is formed in the same manner). Figs. 2, and 3, represent, on an enlarged scale, portions of a steel ring *g,* and pasteboard ring *h,* detached from the cylinder; and figs. 4, and 5, shew a plan and side view of part of the cylinder, with the rings thereon,—the steel rings *g,* project beyond the pasteboard ones, and have notches or hooked teeth, with round enlarged gullets, formed on their peripheries, at intervals of half an inch or more. This form of teeth, together with the spaces between the steel rings, allows the wool or cotton to be drawn in below the surface of the teeth, while the dirt, burrs, or seed remain on the top; and the steel rings are so arranged, that the teeth or notches in adjoining rings will not coincide with each other, as will be readily understood on referring to figs. 4, and 5. In passing the grate *f*, the burrs, &c., are rolled over, and the fibrous material becomes partly separated from them before it is drawn in between the teeth of the steel rings. At the top of the cylinder *e*, there is a stripper *g*, (shewn detached in the plan view, fig. 6,) consisting of a tin, iron, or steel cylinder, upon which metal rings g^1, are fixed at equal distances apart, with connecting pieces g^2, standing out radially from the surface, so as to work close to the teeth of the cylinder *e*, and scrape off the burrs, &c., into the receptacle *h*; after which, the fibrous material is brushed from the cylinder *e*, by the brush-cylinder *i*,—if preferred, wire cards may be substituted for the brushes.

Motion is given to the machine by a band passing around a pulley (not shewn) upon the shaft *j*, of the cylinder *e*, which also carries two other pulleys *k*, and *l*. From the pulley *k*, a band passes to a pulley *m*, joined to a pinion *n*, which is mounted on a stud in the frame *a*, and drives a toothed wheel *o*, fixed on the shaft of the feed-roller *d*; and from this shaft motion is communicated to the roller c^1, by toothed wheels, shewn by dots. The pulley or drum *l*, is connected by a band with the pulley *p*, on the shaft of the brush-cylinder *i*; and this shaft carries a pulley *q*, from which a band passes to a pulley *r*, on the shaft of the stripper *g*.

In conclusion, the patentee says, "What I claim as my invention in the above-described machine is, arranging the metallic rings composing the cylinders *d*, and *e*, so near together that burrs or seeds, &c., cannot fall in between them; the rings having hooked teeth cut in the periphery, as described, and so placed around the cylinder as not to have the teeth on any two adjoining rings to come opposite to each other; by which the wool or cotton is drawn in below the surface of the rings, and the seeds or burrs are cleaned off. Secondly,—I claim the combination of the burring-cylinder *e*, constructed as above described, with the feeding-cylinder *d*, and trash-cylinder *g*, to separate the fibres of cotton or wool from foreign or useless substances."—[*Inrolled in the Inrolment Office, April,* 1846.]

To Frederick Gye, jun., *of South Lambeth, in the county of Surrey, Gent., for improvements in preparing aerated waters, and in vessels to contain aerated and mineral waters.*—[Sealed 10th December, 1845.]

The first part of this invention consists in adding to those mineral waters, which are found in a natural state, an extra quantity of carbonic acid gas, so as to render them more effervescing.

The evil now existing with regard to the use of natural mineral waters is the loss, by transit and from other causes, of the small portion of carbonic acid gas which they contain. By means of this invention, mineral waters may be transmitted in casks or large vessels, and even more than their original freshness may be imparted to them. The mineral water is first passed through a filter, composed of alternate layers of animal charcoal and well-burnt and well-washed sand; it is then charged with carbonic acid gas; and is to be bottled in the ordinary manner. The patentee states, that when using the term mineral water, he means those natural spring waters which contain so large a proportion of foreign matter as to render them unfit for common domestic use, and confer upon the water a sensible flavour, which is capable of exerting a specific action upon the animal frame.

The second part of the invention consists in various methods of securing corks in bottles containing aerated liquors.

The first method of securing corks is represented in Plate XVI., at figs. 1, 2, and 3; figs. 1, and 2, being plan views of the top, and fig. 3, a vertical section of the neck of a bottle. A hole *a*, is made in each side of the rim, and a pin or wire *b*, with a head or button, is used instead of the common wire. [illegible] pin is inserted into one of the holes from below, and, after passing over the cork *c*, enters the other hole from above, and its end being carried round the rim, in the manner shewn, is secured by twisting.

The second method of fastening the corks is shewn at figs. 4, 5, and 6. A hole *a*, is made at one side of the rim, and at the other side a double notch or recess *d*, is formed, as at fig. 4, or a projection *e*, as at fig. 5. The cork is retained in its place by a piece of common wire *f*, bent into the shape exhibited at fig. 7. The looped part is first introduced under the projection, and the wire being then carried over the cork, through the hole *a*, and round the rim, its ends are secured by twisting.

The third method of securing corks is represented at figs. 8, 9, and 10. In this case, a double notch (*d*, fig. 8,) or a projection (*e*, fig. 9,) is formed at each side of the rim; the looped part of the wire is passed under one projection, and its ends are twisted together beneath the other projection. When the corks all project to the same extent from the mouth of the bottles, an elongated ring or link, like that shewn at fig. 11, may be used.

The patentee claims, as his invention, Firstly,—the aerating of mineral waters, as above described. And, Secondly,—the particular modes of securing corks in bottles containing aerated liquors, as above described.—[*Inrolled in the Inrolment Office, June,* 1846.]

To STEPHEN R. PARKHURST, *of Liverpool, in the county of Lancaster, machinist, for a method of propelling vessels.*— [Sealed 17th November, 1845.]

THE novelty of this invention consists in a mode of applying upright propelling wheels at the sides or any other parts of ships or vessels; the wheels being immersed in the water, and encased in such a manner, that only part of each wheel will protrude beyond its casing: the number of wheels may be varied as required.

In Plate XVIII., fig. 1, is a side view, and fig. 2, a plan view of the wheels and casings applied to one side of a ship or vessel; the upper cover of one of the casings being removed. *a, a,* are the upright wheels, the axles *b, b,* of which carry drums or pulleys *c, c,* to be driven by bands from the engine on board the vessel, or by other suitable means; and the patentee prefers that the blades of the wheels should work as close as possible to the interior of their casings. *d,* is a projection of timber, to prevent injury to the machinery in the event of the vessel coming alongside of another vessel; and *e,* is the external framing of metal, fixed to the side of the ship.

In place of using a framing of the above description, containing the recesses for the propelling wheels, the sides of the vessel may (when being built) be formed with recesses suitable for receiving the upright propelling wheels.—[*Inrolled in the Inrolment Office, May,* 1846.]

To THOMAS BELL, *of Don Alkali Works, South Shields, in the county of Durham, for improvements in certain processes in the manufacture of alkali; which improvements are applicable to the purposes of condensation.*—[Sealed 3rd November, 1845.]

THIS invention is divided into two parts: the first part refers to a method of condensing the muriatic acid evolved in the manufacture of sulphate of soda.

For this purpose, the patentee employs several "columns" (pipes) such as have been heretofore used for condensing; and he prefers that there should be four columns, about twenty feet high, and six feet in diameter. The columns are filled with coke, broken into pieces of the size of large walnuts, and water is allowed to flow in small streams, from above, through the coke; the columns are connected in such a manner, that the acid vapours will ascend through one column and descend through the next, and so on. The improvement consists in combining with the use of these or similar condensers, a peculiar means of obtaining a draft through the condensers. The draft may be obtained by a jet of steam acting through a cone (a tube might be used, but not so effectually), or by connecting the condensers with a vessel in which a vacuum has been produced by the condensation of steam, or by applying a fan or similar mechanical apparatus to a flue leading from the last condenser. The mode of employing a jet of steam passing through a cone is shewn in Plate XVIII., at fig. 1, which is a section of the outer end of a flue from the last condenser. *a*, is the flue; *b*, the cone; and *c*, the steam-pipe. The patentee does not claim any of these modes of producing a draft; this part of his invention consisting merely in the combination of these modes with the use of the above-mentioned condensers.

To prevent any escape of deleterious vapour into the atmosphere, the patentee proposes to place between the condensers and the exhausting apparatus a close cistern, partly filled with water, and having one or more partitions, descending from the upper part, and dipping a few inches into the water.

The second part of this invention consists in employing similar condensers, with the above modes of exhaustion, for condensing the acid fumes or vapours in the manufacture of sulphuric acid.

Fig. 2, is a vertical section, and fig. 3, a plan view of an ordinary sulphuric acid chamber, together with the condensing apparatus. *a*, is the sulphuric acid chamber; *b*, the pipe through which the sulphurous acid and nitrous fumes enter the chamber; and *c*, *c*, the columns, containing broken coke or other suitable material. In this case, water is not allowed to descend through the coke, but a jet of steam is admitted at *d*, as well as into the chamber at *e*. The vapours or fumes not converted into sulphuric acid in the chamber *a*, will proceed through the pipe *f*, into the condensers *c*, *c*, and pass through the same by their elastic force, in consequence of the state of exhaustion in which the condensers are kept by the jet of steam at *g*, passing through the cone *h*; or the desired exhaustion may be obtained by a jet of steam passing through a tube, or by the condensation of steam, or by using a fan (in connection with the pipe *k*,) or other mechanical means. The patentee states that he obtains a much greater produce of acid from the condensers than from the sulphuric acid chamber in the same time; hence he is enabled to add more burners to the chamber. He also states that he has made sulphuric acid by using the condensers only.

The claims made by the patentee are, Firstly,—the mode of condensing muriatic acid, evolved in that part of the manufacture of alkali which consists in converting common salt into sulphate of soda. Secondly,—the mode of condensing the acid fumes or vapours in the manufacture of sulphuric acid, by applying condensers of the description above mentioned, exhausted by steam, or by a fan, or other mechanical means.—[*Inrolled in the Inrolment Office, May,* 1846.]

To JOHN LESLIE, *of Conduit-street, Hanover-square, in the county of Middlesex, tailor, for improvements in the combustion of gas.*—[Sealed 4th December, 1845.]

THIS invention consists in a peculiar mode of constructing gas burners, for the purpose of obtaining a larger supply of atmospheric air at the point of ignition of the gas.

The burner consists of a series of tubes of metal, glass, porcelain, china, or other suitable material, rising out of the supply-pipe, and forming a conical or similar figure; each tube is distinct from the others, but, at the point where combustion is to take place, they touch or nearly touch each other. When the gas issuing from the different tubes is ignited, the flames unite, and produce a flame of a circular or other hollow form.

In Plate XVIII., fig. 1, is a vertical section of the improved burner, and fig. 2, a plan view of the same. *a*, is the supply-pipe; *b*, *b*, are the tubes, combining together to form a circular flame at *c*; and *d*, is the glass chimney, which the patentee prefers to form in the manner represented.

The patentee does not confine himself to the above details, so long as the peculiar construction of gas-burner be retained; but he claims the constructing and applying gas-burners as above described, whereby the combustion of gas will be improved.—[*Inrolled in the Inrolment Office, June,* 1846.]

To William Maugham, *of Newport-street, in the county of Surrey, consulting chemist, and* Archibald Dunlop, *the younger, of Upper Thames-street, in the city of London, Gent., for improvements in the manufacture of ale, porter, and other fermented liquors.*—[Sealed 27th November, 1845.]

This invention consists in heating ale, porter, and other fermented liquors (after they have undergone the ordinary process of vinous fermentation), to such a temperature as to arrest the further progress of the vinous fermentation, in order that the liquors may be introduced into bottles under pressure, with the addition of carbonic acid gas.

The ale, porter, or other fermented liquor is put into a cask or other suitable vessel, containing a coil of tin-piping similar to the worm in a worm tub; and the liquor is brought to a temperature of from 150° to 160° Fahr., by passing steam through the pipe. While the heating process is going on, the bung should be inserted into the bung-hole of the cask (but only so tight as to require a slight exertion to remove it), to prevent the liquor from being exposed to the external atmosphere; and as soon as the required heat has been obtained, the cask is to be securely closed; and then the liquor is to be cooled down to the temperature of the atmosphere, by passing cold water through the pipe. After the ale or porter has been thus heated and cooled down, the patentees, instead of using what are termed "finings" for rendering it clear and bright, effect this object by passing it through a filter; taking care that as little air be admitted to the liquor as possible: for this purpose, the cask or vessel containing the ale or porter is connected with the upper part of a closed filter, composed of layers of sand and animal charcoal, and the lower part of the filter is connected with the receiving vessel, which is exhausted of air, and then the ale or porter is permitted to flow from the cask, through the filter, into the receiving vessel; a sufficient quantity of air being admitted into the cask to allow this to take place. The ale or porter is then charged with carbonic acid gas and bottled, which the patentees state may be most conveniently done by using the apparatus described in the specification of a patent obtained by Messrs. Purt and Hale, Dec. 8, 1842.

The patentees claim, as their invention, the heating of beer, or ale, or other fermented liquor, after it has undergone fermentation, to prevent any further vinous fermentation taking place.—[*Inrolled in the Inrolment Office, May,* 1846.]

To JAMES BOYDELL, Jun., *of Oak Farm Works, near Dudley, iron-master, for improvements in the building of ships and other vessels.*—[Sealed 17th November, 1845.]

THE first part of this invention consists in a mode of building ships and other vessels of iron and wood.

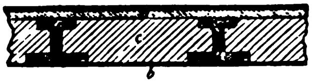

Fig. 1, in the margin, is a horizontal longitudinal section of part of the side of a ship or other vessel. *a, a,* are two ribs, made of angle iron, to the inner surfaces of which the plates of iron *b, b,* are rivetted; the spaces between the ribs are filled with wood *c,* (the grain of the wood running in a direction fore and aft of the vessel) and the outer surface of the wood is made flush with the outer surface of the iron ribs; over the wood *c,* and ribs *a,* the planking *d,* is fastened, and the copper or other sheathing is then applied. The seams in the planking and other wood-work are to be caulked in the ordinary manner.

The second part of this invention consists in a mode of building ships and other vessels of iron.

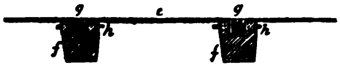

Fig. 2, in the margin, is a horizontal longitudinal section of part of a ship's side. *e, e,* are the sheets of iron, which are not rivetted to the ribs *f, f,* as usual, but the ends of the sheets are bent at right angles, and enter the grooves in the ribs, being wedged tightly therein by the wedge-formed bars *g, g;* and these bars are fastened by driving keys *h, h,* through them.

The patentee claims, Firstly,—the mode of constructing ships or vessels, by combining ribs *a, a,* with iron plates *b,* and wood *c, d,* as above described; and also the applying copper or other metal sheathing in combination with wood planking applied to an iron-built ship or vessel. Secondly,—the mode of fastening the plates of iron to a ship's side, by having grooves in the ribs, and bending the plates, as above described.—[*Inrolled in the Inrolment Office, May,* 1846.]

To SAMUEL CUNLIFFE LISTER, *of Manningham, near Bradford, in the county of York, for improvements in carding, combing, and spinning wool.*—[Sealed 12th December, 1845.]

THE first part of this invention consists in preparing short fine wool upon drums or cylindrical surfaces, having not less than nine teeth to the square inch; which teeth project about three-quarters of an inch from the surface of the drum. The wool is fed on to the drum by suitable feeding rollers; and when the spaces between the teeth become filled with wool, it is removed by hand or other means. The drums hitherto used have been filled with teeth so coarse that the wool has not been sufficiently opened and teazed; and the novelty of this part of the invention consists in using machines, as preparers, with teeth set so fine that the wool will be well opened before being filled on to combs, and afterwards worked by combs, and yet the yarn will have less of the character of woollen yarn than when it has been carded before being combed.

The second improvement consists in arranging machinery so that card or what are known in the trade as "porcupine teeth" are caused to operate upon short fine wool, in order to comb the same; such teeth first operating upon the point of the wool, and gradually working up to the head of the comb which holds the wool. The drawing in Plate XVII., represents a vertical section of so much of a machine as is required to explain this part of the invention. *a,* is a curved or endless comb, for holding the wool; it receives motion in the ordinary manner, and has a suitable feeding and drawing apparatus applied thereto. The wool is operated upon by an endless sheet *b*, furnished with teeth about an inch long, and travelling over two rollers *c*, *d*; the largest roller *d*, being caused to rotate by any convenient means, communicates motion to the endless sheet. When the spaces between the teeth of the sheet *b*, become filled, the wool is removed by the workman, and refilled on to the comb *a*. The same result may be produced by employing a drum furnished with teeth; but the patentee prefers the endless sheet, although he does not confine himself thereto, so long as the wool is first operated upon at the points of the teeth and is gradually worked up to the head of the comb; or the card or porcupine teeth work "head and head" with the comb that holds the short fine wool, when the combs filled with such wool are drawn off, after being worked by card or porcupine teeth. But if the wool is slipped from one comb to another, after being worked, in order to be drawn off, then the patentee claims the slipping of the wool on to combs of a larger size than seven inches; as it will be found that a larger quantity of work may be done, and with greater ease, than by using combs of a smaller size.

The third improvement consists in combing short fine wool in a dry state, after being carded; as the wool may then be drawn from the combs with less heat than when combed in a moist or damp state. The patentee says he is aware that short fine wool has been worked by a card cylinder in connection with a comb, that is to say, the comb holding the wool whilst the card cylinder worked it; but what he claims is, combing such wool whilst in a dry state, when worked by combs. It will be found that if the wool be carded and then combed in a dry state, the wool will be of a bad color; and the patentee claims the washing of such wool, either before being prepared for spinning or after being spun.

The last part of this invention consists in spinning short fine wool upon mules, after it has been carded and combed. It is well known that very short wool may be combed after being carded, but it is difficult to spin such wool: by using the mule, the spinning of it is much facilitated. The patentee claims the spinning short fine wool upon mules, after being carded and combed.—[*Inrolled in the Inrolment Office, June,* 1846.]

To Samuel Thomas Cromwell, *of Romsey, in the county of Hants, teacher of music, for his invention of improvements in apparatus to be applied to piano-fortes.*—[Sealed 11th November, 1845.]

This invention of improvements in apparatus to be applied to piano-fortes, consists in an arrangement of stops for producing harmonic sounds, which form a kind of echo to the ordinary quality of tone produced by piano-fortes, and at the same time raise the pitch of the instrument. The manner in which this new effect or quality of tone is obtained in piano-fortes is, by placing over the string or strings of each note or half-note, at about the middle of their length, an elastic stop, which, being pressed upon the strings, will reduce the vibration and produce the harmonic sound. In Plate XVII., the improvements are shewn as applied to a cottage and a square piano-forte, and it will be obvious that the harmonic stops may be also applied in a similar manner to any other construction of piano-fortes.

Fig. 1, represents an elevation of a cottage piano-forte, the "action" and keys being removed, the better to shew the arrangement of the strings and the application of the improved apparatus; and fig. 2, is a cross section of the cottage piano-forte, shewing the relative position of the "action" and the apparatus for producing the harmonic sounds. A, A, is a bar which stretches across the strings and carries the harmonic stops. This bar is composed of two flat pieces of metal, attached together in such a manner as to leave a space or slot between them (of nearly their whole length); in which space or slot metallic springs *a, a, a,* are placed vertically and parallel to each other, at such distances apart that each shall stand in front of the strings of the note it is intended to command or act upon. In this position the springs *a,* are secured by means of screws (see the detached view fig. 3, which is drawn on an enlarged scale). Each end of the bar A, is provided with a pivot, working in sockets at either side of the casing of the piano-forte; which pivots support the bar, and allow it to vibrate slightly, as will be presently explained. On the upper end of the springs *a*, a piece of metal *b*, is attached, which stands out at right angles with the spring and has a slot cut in its outer edge to receive a piece of leather or other soft substance, the pressure of which upon the strings will lessen the vibration and produce the new effect or quality of tone before mentioned. *c*, *c*, are springs attached to the frame of the piano-forte and intended to act upon the bar A, and keep the stops of the bar clear from the strings. The mode of bringing the stops into action will be seen at fig. 2. *d*, is a pedal connected by means of a rod *e*, to a lever *f*, which, in this arrangement, passes between the vertical rods of the "action." This lever *f*, has its bearing in the frame of the "action," and is provided at its short end with a bent piece *g*, which is always in contact with the bar A. It will now be seen that if the foot of the performer is placed on the pedal *d*, the long end of the lever *f*, will be depressed, and the bent end *g*, being consequently raised, will drive forward the bar A, and bring the stops *b*, in contact with the strings; and these stops being, as before stated, placed so as to act on the middle of the string (that is, the middle of that portion of the string which is made to vibrate by the action of the hammer), will, in a great measure, check the vibration and produce a soft harmonic sound; but immediately the foot is removed from the pedal, the springs *c*, *c*, will force the bar A, into its former position, free the strings from the stops *b*, and allow the piano-forte to produce the ordinary quality of tone as before. The exact position of the stops is regulated with great nicety by means of the screws in the bar A.

At figs. 4, and 5, the improvements are shewn as applied to a square piano-forte; fig. 4, being a longitudinal vertical section, and fig. 5, a plan view, with the upper part removed, to shew the arrangement of the harmonic stops more clearly. The action and the effect are very similar in this instrument to that of the one above described; the bar A, and stops *b*, being placed over instead of in front of the strings. In this arrangement, the action of the pedal is conveyed directly to the bar by a vertical rod *e,* the upper end of which passes through an eye in the end of a rod *f,* and is secured thereto by a nut or pin. This rod *f,* is attached to the vibrating bar A, which carries the stops, and thus, when the performer depresses the pedal, the rod *e,* will pull down the rod *f,* of the bar A, and bring the harmonic stops to act upon the strings. The patentee remarks that he does not confine himself to any particular mode of depressing the stops, as a variety of plans may be adopted, according to the construction of the piano-forte or the fancy of the maker. A method which might under some circumstances be preferred for actuating the stops of a cabinet or cottage piano-forte, is represented in the detached view, fig. 6. *a,* is a fixed centre-pin on the frame of the "action," and on this pin a peculiarly-formed arm *b,* works freely. The end of this arm is formed into a cam or tappet, and it is worked up and down by a rod *c,* attached to a pedal *d,* at its lower end. On the upper end of this rod *c,* an eye or slot is formed, which embraces the arm *b,* and draws it down when the pedal is depressed by the foot of the performer. When thus depressed, the largest diameter of the cam or tappet end of the arm *b,* will come in contact with the vibrating bar A, (which carries the stops) and press the stops forward on to the strings, as before explained. The pedal being provided with a spring beneath, will, when the performer's foot is removed, rise up, and carry with it the rod *c,* which will push the arm *b,* into its former position, and allow the vibrating bar A, to fall back and release the strings from contact with the stops. Instead of making the stops press on the middle of the strings (and thus raise the pitch of the notes one octave), the harmonic effect may be obtained by placing the stops at other harmonic distances on the strings, say one-third or two-thirds the length of the vibrating portion of the strings, measuring from the bridge, as will be well understood by all persons conversant with the science of music.

The patentee claims the application of stops to the strings of piano-fortes (intermediate of their length) for the purpose of producing harmonic sounds and new effects or qualities of tone.—[*Inrolled in the Petty Bag Office, May,* 1846.]

Specification drawn by Messrs. Newton and Son.

To James Garforth, *of Dukinfield, in the county of Chester, engineer, for improvements in machinery or apparatus for connecting metallic plates, for the construction of boilers and other purposes.*—[Sealed 10th December, 1845.]

These improvements in machinery or apparatus for connecting metallic plates for the construction of boilers consist in the direct application of the expansive force of steam to the dies for rivetting such plates together, and in an arrangement of machinery whereby such force is brought into action.

In Plate XVI., fig. 1, represents a plan or horizontal view of an arrangement of machinery or apparatus designed for connecting or rivetting metallic plates for the construction of steam-boilers; fig. 2, is a side view; and fig. 3, a section, taken longitudinally through about the centre of the apparatus. *a, a,* is the frame-work for supporting the steam-cylinder *b, b,* in which a steam-tight metallic or other piston *c, c,* works; this piston *c, c,* is mounted upon the rod *d, d**, which passes out through stuffing-boxes *e, e,* at each end of the cylinder *b, b;* in the end *d**, of the piston-rod the die *f,* is fixed, the other die *g,* being mounted in the pillar *h,* which is fast to the frame-work. Steam being admitted through the entrance or feed-pipe *i,* it passes onwards through a common slide or other valve *k,* to the cylinder; and after having performed its office, is allowed to pass out through the pipe *l.* The slide-valve *k,* is worked by hand, by means of the lever *m,* so as to admit the steam on either side of the piston, as required.

The operation of the apparatus is as follows:—Steam of a sufficient pressure being admitted (by means of the slide-valve *k,*) at the back, or as it appears in fig. 3, of the drawing, at the left-hand side of the piston *c, c,* that piston will be forced, together with the piston-rod *d, d**, in the direction of the arrow, and form the ends of the rivet *n,* between the two dies *f,* and *g;* thus firmly connecting the plates *o,* and *p,* and thereby producing a perfectly steam, air, or water-tight joint.

The head of the rivet is formed at one or more blows, as required; the intensity of the blow depending upon the area of the piston, the length of the stroke, and the pressure of the steam employed. The valve *k*, is then reversed, to admit the steam in front of the cylinder; which movement will withdraw the die *f*, when another rivet may be put in, and the operation proceeds as before.

The patentee remarks, that he does not intend to confine himself to the use of steam alone for such purposes, as the direct pressure of water, air, or other elastic medium may be similarly employed, without departing from the principle of his invention. He states, that he does not claim the exclusive use of the several parts of the above-mentioned apparatus, when taken separately, but only when employed for the purposes of his invention, which consists in the rivetting of metallic plates by dies, driven by the elastic force of steam, water, or other elastic medium, as above described.—[*Inrolled in the Petty Bag Office, June,* 1846.]

To JOHN DAVIES, *of Manchester, in the county of Lancaster, patent agent, for certain improvements in the method of dyeing or staining woven or piece goods or fabrics, and in the machinery or apparatus to be used for such or similar operations,—being a communication.*—[Sealed 25th October, 1845.]

THESE improvements in the method of dyeing or staining woven or piece goods or fabrics, and in the machinery or apparatus to be employed for such or similar operations, apply to that particular style of dyeing or staining, whereby the color is deposited upon the goods or fabrics in longitudinal stripes (either straight or waved); such stripes being darker in the centre, and gradually shaded or softened off towards the edges, and termed, in the trade, "rainbowing." The invention consists in the application or use of a tube or tubes, having small fountain jets or spouts, through which the coloring matter is forced (either heated or otherwise), while the cloth or fabric, to be dyed or stained, is caused to pass through the machine. The coloring matter is thus deposited upon, or forced through, the cloth or fabric, in stripes corresponding in number and distance apart with the said fountain jets or spouts; the capillary attraction causing the dye or color to spread, and gradually shade and soften off towards the edges of the stripe.

In Plate XVIII., fig. 1, represents a longitudinal section of an arrangement of machinery or apparatus, designed for the purpose of dyeing or staining piece goods or fabrics, in the particular style hereinbefore-mentioned, called "rainbowing." Fig. 2, is a plan or horizontal view, and fig. 3, a transverse section of the same, the lower end of the framework being removed. *a, a,* is the main framing of the machine, standing at a convenient height for the attendance of the workman. To this framing the bracket *b,* is fixed, for supporting the vessel *c,* which contains the coloring matter for dyeing or staining the goods or fabrics; the coloring matter is kept heated by being enclosed in a steam-jacket or casing *d.* To the vessel *c,* is attached the tube *e,* communicating, through the tap *f,* with the main tube *g,* which is furnished with several small fountain jets or spouts *h, h, h,* for supplying the coloring matter to the cloth. These jets may be made adjustable, so as to regulate their distance apart, and they may be furnished with stops or taps, if desired. The cloth or fabric, to be dyed or stained, is lapped upon the roller *i,* and passed under the tension rollers *k, k,* and over the fountain spouts or jets *h, h,* to the roller *l,* to which it is made fast. The tap *f,* in the tube *e,* is then opened, which will allow the color to flow or rise with considerable pressure through the fountain spouts or jets *h, h,* and thus stain or dye the cloth or fabric, which is caused to pass over them, and lap upon the roller *l,* by turning the winch handle *m,* or by any other convenient means. Thus the cloth or fabric will be dyed or stained in longitudinal stripes, extending from end to end of the piece; the capillary attraction causing the color to spread, and gradually shade or soften off towards the edges of the stripe. *n, n,* is a trough, for the purpose of catching the superfluous coloring matter, and conveying it into a vat or other convenient receptacle below. The cloth or fabric under operation must be passed and repassed through the machine, until the required depth of color or dye, in the centre of the stripe, is obtained. If it be desired to produce the stripes in waved or other lines (instead of direct lines), a suitable traverse motion must be given to the cloth rollers, or to the tube *g*. Two, or any desired number of the tubes *g*, *g*, and sets of spouts or jets *h*, *h*, may be used, if preferred; in which case, the cloth or fabric will not have to be passed through the machine so frequently to obtain a deep tint.

The patentee claims the application, employment, or use of the tube or tubes *g*, *g*, provided with fountain spouts or jets *h*, *h*, for the purpose of dyeing or staining woven or piece goods or fabrics, in the manner hereinbefore particularly described and exhibited in the drawing.—[*Inrolled in the Petty Bag Office, April,* 1846.]

To WILLIAM JOHNSON, *of Farnworth, near Bolton, Lancashire, agent, for certain improvements in machinery or apparatus for preparing cotton and other fibrous substances for spinning.*—[Sealed 20th November, 1845.]

THESE improvements in machinery or apparatus for preparing cotton and other fibrous substances for spinning, apply to those machines commonly called "scutchers" or "lap machines," which are employed for the purpose of clearing the cotton or other fibrous substances from dirt and other extraneous matter, and forming the same into a lap or sheet, preparatory to its being submitted to the operation of the carding-engine.

The object of this invention is to condense the fibres of cotton, so as to make a much more solid sheet, and to allow of a much greater length of cotton or other fibrous material being put upon a "lap" of the same circumference.

The figure in Plate XVIII., represents, in longitudinal section, an ordinary scutcher or lap machine, with the improvements applied thereto. *a*, *a*, *a*, is the side-framing of the apparatus, and *b*, *b*, *b*, the endless travelling-cloth, for carrying the cotton or other fibrous substance under operation into the machine. The cotton is evenly distributed by hand on the cloth, and is thence conducted between the fluted feed-rollers *c, c,* and *d, d,* to the beater or scutcher *e, e,* which opens the fibres of cotton or other fibrous material; the dirt or other extraneous matter falling through the bars of the grid or grate *f, f.* The cotton or other fibrous material then proceeds over the grid or grate *g,* to the wire cylinder or cage *h,* which is connected to a rotary fan or other exhauster, whereby a strong current of air is created to draw the dust through the wire cylinder *h,* and cause the loose filaments of cotton, &c., to be formed into a sheet upon the surface of the cylinder. The sheet of cotton or other fibrous material is delivered on to the endless travelling-cloth *i, i,* by the roller *k,* which revolves in the opposite direction to the cylinder, and strips it off therefrom. The sheet of cotton or other fibrous substance then passes through the pair of calendering-rollers *l, l,* to the lap-roller *m,* upon which it is wound or lapped by friction of contact with the fluted rollers *n, n.*

The improvement consists in placing an additional pair of calendering-rollers *o, o,* (or more, if required) above the rollers *n, n,* and passing the cotton between them, whereby a much greater pressure is obtained, and, consequently, a much firmer and more compact sheet or lap is produced; by which means, a much greater quantity of cotton or other fibrous material than usual may be put upon a lap of the same diameter.—[*Inrolled in the Petty Bag Office, May,* 1846.]

To WILLIAM DIMES, *of Oldston, near Dartmouth, in the county of Devon, Esq., for improvements in the making and fixing of window-glass.*—[Sealed 10th December, 1845.]

THE improved mode of manufacturing window-glass, which constitutes the chief feature of this invention, is as follows:—The "metal" used in making the glass is composed of the ordinary materials, and subjected to the common fritting and melting processes; but, instead of being formed into plates by blowing, it is transferred, by means of ladles, from the melting-pot to a casting-table, placed in a furnace, and raised to a white heat. The table is made of gun-metal or cast-iron, about nine feet long by six feet wide; it has a moveable rim, of a height corresponding to the required thickness of the glass, and is divided lengthwise by moveable metal ridges, of the same height as the rim, and placed at suitable distances apart to form the glass into plates of the desired width: the rim is fastened to the table by countersunk screws; and the moveable ridges are retained in their places by their ends entering into grooves in the top and bottom portions of the rim. The fluid metal, being poured upon the table to the height of the rim, is flattened by a heavy roller of gun-metal or iron, and then gradually cooled down until it is in a sufficiently solid state (although yet warm) to be lifted from the casting-table, in lengths of about nine feet, on to an annealing-table, which is an exact counterpart of the casting-table, except that it is made of fire-clay, and that each of the longitudinal divisions is slightly raised in the centre, so as to exhibit, in its transverse section, the segment of a circle of large diameter. The annealing-table is kept in the annealing-furnace during the usual time, and when the plates are taken out, they will be found to have assumed a curved form; so that, when used in the formation of windows, any water that may fall upon them will run to the centre of the pane, instead of running to the edges, and thus the decay of the wood, or other material of which the frame may be constructed, will be avoided;—the concave surface of each pane is to be on the outside of the window, and the convex surface will, consequently, be on the inside. Water can only be formed on the inside of the window by the condensation of steam upon it, and this water, as it is formed, will be found to concentrate on the convex ridge, and flow down the same to the under part of the frame, where it may be collected in a groove or gutter: the dripping of water from glass roofs, which often produces serious injury to the articles beneath (such as delicate plants in conservatories or green-houses, and fine goods in store-rooms or warehouses), is by this means wholly prevented.

When there is not a separate frame for each pane, the patentee forms them with bevilled edges, by rough grinding; so that when the edge of one pane is laid upon the edge of another, the surface, thus formed, will be perfectly even. He proposes to use, as a substitute for putty in making such joints water-tight, a solution of caoutchouc or gutta-percha, thickened with French chalk and a small quantity of powdered sulphur: this cement, although unaffected by ordinary changes of temperature, may, after it has become hard, be easily softened, by passing a hot iron over the joints; and thus a pane may be readily removed, without injury to the frame.

The patentee claims, Firstly,—the improved mode of making window-glass, above described, that is to say, of a curved form in the direction of its length (without limiting himself to any particular degree or form of curvature), and bevilled at the edges. Secondly,—the employment, in the fixing of window-glass, of a cement, compounded of the materials above mentioned.—[*Inrolled in the Inrolment Office, June,* 1846.]

To HENRY MANDEVILLE MEADE, *of the city of New York, in the United States of America, Gent., for improvements in the manufacture of bread,—being a communication.* [Sealed 20th December, 1845.]

THE first part of this invention relates to the manufacture of bread from the flour (or meal, as it is frequently called) of Indian corn and wheaten or rye flour.

In place of mixing the Indian corn flour with the wheaten or rye flour, and then making the bread in the ordinary manner, the patentee proceeds as follows:—The Indian corn flour is first scalded with boiling water, and spread out to cool. A sponge is prepared from wheaten or rye flour with brewers' or bakers' yeast (brewers' yeast requiring to be mixed with double the quantity of water that would be used with bakers' yeast), by making a batter of part of the wheaten or rye flour with the yeast and water, and then adding further quantities of flour to make it thick enough to rise. When the sponge is light, it is well beaten, and the scalded and cooled Indian corn flour mixed with it; the remainder of the wheaten or rye flour is then added, and the whole is covered up and allowed to rise until perfectly light; after which, it is divided into loaves, and baked in tins. The proportions in which the materials are used are, from one-third to one-half, by weight, of Indian corn flour, and from two-thirds to one-half of wheaten or rye flour; but these quantities may be varied, if desired.

In the above process no ferment is used; but the patentee prefers to employ a potato ferment, or a ferment prepared from Indian corn flour. The potato ferment is made in the usual way, and, after being strained through a colander, is added to the sponge, and then the scalded Indian corn flour and the remainder of the wheaten or rye flour is mixed, as before described;—about 20 lbs., or more, of potatoes are used in making the ferment for a batch of 10 bushels. The bread thus made, by combining Indian corn flour and wheaten or rye flour, is called "union bread."

A ferment (the preparation of which constitutes the second part of this invention) is made from Indian corn flour in the following manner, supposing the batch to be about 10 bushels:—Malt and hop liquor is first made, the same as for a potato ferment, and one gallon and a half of it, in a cold state, is mixed with water at a temperature of from 80° to 100° Fahr.; into this liquor 5¾ lbs. of Indian corn flour, 2¼ lbs. of rye flour, and rather more than 1 lb. of bean flour are stirred (the patentee prefers that these matters should be well mixed and sifted together previous to so using them); and, after they have been stirred for ten minutes, 2 lbs. of wheaten flour are stirred in. The tub being in a warm situation is then covered with a sack or cloth, and allowed to stand until the fermentation is completed, which will take about eight hours, when it will sink; the ferment is then ready for mixing into a sponge in the same manner as a potato ferment: it is not only applicable to the manufacture of the "union bread," but also for making wheaten or other bread.

The patentee does not claim the use of Indian corn generally; nor does he confine himself to the above details. He claims, Firstly,—the mode, above described, of making bread from Indian corn and wheat or rye, by first producing a sponge with wheaten or rye flour, and combining the meal or flour of Indian corn therewith; and also the combining the use of a potato ferment with Indian corn and wheaten or rye flour for making bread. Secondly,—the applying a ferment of Indian corn in the manufacture of bread.—[*Inrolled in the Inrolment Office, June,* 1846.]

To Eden Thomas Jones, *of Bristol, manufacturing chemist, for improvements in the apparatus used in the concentration of sulphuric acid.*—[Sealed 27th November, 1845.]

Considerable inconvenience has frequently been experienced in the ordinary process of concentrating sulphuric acid in glass vessels, from the frequent breaking of the glass vessels employed in the operation, entailing thereby a loss of the acid (to the great annoyance of the neighbourhood); and from the necessity of maintaining a high degree of temperature in the laboratory, to defend the glass vessels from all drafts or currents of cold air, which prove so destructive to the vessels when they are highly heated, great care is required. To remedy these inconveniences, the patentee employs a vessel which he terms a protector, made of sheet-iron, tin, or other material not liable to be injured by the heat of the process; it may be cylindrical, square, or of any other figure, provided it completely envelopes the glass vessel or retort when at work; and it should be four or five inches larger in diameter and height than the glass retort, so as to enclose the latter in an atmosphere of hot air during the operation. The advantages to be derived from the application of this invention are as follows:—The process will be shortened, a considerable saving in fuel and labour will result, and the glass vessels will last longer.

The patentee claims the protecting of vessels of glass or glass retorts used in the concentration of sulphuric acid, for the purpose of defending them from the injurious effects of cold air, as described.—[*Inrolled in the Inrolment Office, May,* 1846.]

To Thomas Findler, *of the city of Glasgow, in the county of Lanark, in Scotland, flint miller, for a new invention or improvements in the construction and operation of certain parts of flint-grinding mills, and other grinding mills or machinery for grinding.*—[Sealed 15th December, 1845.]

The patentee commences his specification by saying, that he claims, as the first part of his invention, giving rotary motion to the pan used in grinding potters' materials, such as flint, Cornwall stone, &c.; which pan carries round, enclosed within it, the under stones or pavement; whereas, in the ordinary mode of grinding, the pan containing the under stones is firmly fixed on the floors of the mill-rooms. Secondly,—he claims communicating rotary motion to the under stones and pan in a contrary direction to the motion of the upper stones or runners and arms, or in the same direction as the upper stones; whether the said motions be equal to one another, or varying in speed. Thirdly,—he claims the application of the same principle and improvement to all other purposes whatever to which the same may be applicable, such as machinery for grinding corn, lime-stone, colors, dyes, bones, wheat, barley, peas, tobacco, &c. Fourthly,—he claims the use and application of the moving pan containing the under stones, where the upper stones may be in a loose state and moveable, as in the common flint-mills, and also where the upper stones may be either in an entire piece, or in various pieces attached together, so as to form a compound stone.

The last part of this invention consists in a mode of giving rotary motion to the pan. In ordinary flint-grinding mills, the motion of the upper stones is caused by a single vertical shaft, in the centre of the pan, connected by wheels with the engine-shaft. The rotation of the pan, according to this invention, is produced by two additional shafts, outside the pan, and an extension or addition below the pan to the vertical shaft in the centre. The central shaft is divided into two parts; the lower part produces the rotation of the pan and under stones, and has a socket at the top, to receive the upper portion of the shaft, which carries round the upper stones. The several shafts are connected together by suitable gearing.

The patentee claims "the mode of the application of the said shafts and machinery for the above-named purposes and improvements."—[*Inrolled in the Inrolment Office, June,* 1846.]

To HENRY CLARK, *of Redcross-street, Cripplegate, in the city of London, oil merchant, for certain improvements in the preparation of materials to be employed for producing illumination.*—[Sealed 31st October, 1845.]

THESE improvements in the preparation of materials to be employed for producing illumination consist in a novel mode or process by which an essential oil, produced from the distillation of resin, may be purified and rendered a fit substitute for oil, capable of being burned in lamps and employed in other situations.

The most economical material which can be used is the essential oil obtained by the distillation of the resin of commerce, commonly called resin oil or pine spirit. Any given quantity, say one gallon, of this material, produced in any of the known ways, is placed in an earthen, wooden, metallic, or other suitable vessel, and the purifying matter is introduced thereto. This purifying matter consists of caustic potash, soda, or lime, mixed with water, in the proportion of (say) from eight to sixteen ounces of the caustic material to one pint of water: but these proportions may be varied according to the condition of the essential oil or spirit to be acted upon, that is to say, when the oil or spirit is more foul than usual, or contains a great quantity of coloring matter, then the larger quantity of the caustic material is employed. Into the vessel containing the said gallon of essential oil or spirit, from one to four pints of the caustic solution, either in a cold or warm state, is introduced,—the quantity of the solution required depending upon its strength and the condition of the spirit or essential oil, which is a matter that cannot be readily defined, except in a general way. It may, therefore, be stated generally, that the oil of resin, in its usual commercial state, will be properly acted upon by a solution of eight ounces of the caustic material in a quart of water, applied to a gallon of the essential oil.

These materials being introduced into the vessel, as above said, must be agitated continually, for the space of from one to two hours; and when the mixture has been so treated, it may be allowed to settle for about twelve hours; and being then drawn off, and filtered through a layer of cotton-wool and animal charcoal (fresh calcined) it is in a fit or purified condition for burning and for commerce.

When the essential oil is required to be brought to a more purified condition, it is taken from the vessel in which it has been acted upon by the caustic alkali, and submitted to a process of distillation. The patentee prefers to introduce the caustic materials with the essential oil into the still, in order that they may be distilled together, which produces the best result; but he sometimes distils the essential oil, when drawn off from the alkaline solution, without the caustic material, merely introducing into the still a quantity of water, sufficient to prevent the oil from charring; or the same object may be effected by introducing into the still a jet of high-pressure steam. The essential oil, after it has passed through the still, must be subjected to filtration, through cotton-wool and charcoal, as before said.

The patentee states, that he does not confine himself to the use of oil of resin alone, but he applies his process of purification to any description of essential oil, obtained from resinous substances; he therefore claims, Firstly,—treating resinous essential oils with caustic alkali, in the way described, for the purpose of purifying such oils; and, Secondly,—a further process of purifying the said oils by means of distillation, as above described.—[*Inrolled in the Petty Bag Office, April,* 1846.]

Specification drawn by Messrs. Newton and Son.

To WILLIAM YOUNG, *of Paisley, manufacturer and dyer, and* ARCHIBALD MC NAIR, *of the same town, merchant, for certain improvements in the construction and means of manufacturing apparatus for conducting electricity.*— [Sealed 4th August, 1845.]

THIS invention of improvements in the construction of apparatus for conducting electricity consists of a new and improved method of manufacturing electric conductors. The electric conductors are formed of one or more copper, iron, or other metallic or mixed metallic wires, which may be covered with cotton, woollen, or linen thread, in a manner similar to those termed "bobbin wires" used in the manufacture of caps and bonnets; or the wires may be covered with threads in a plaited or braided form, by means of a braiding-machine; such description of covering being much stronger and less likely to be disturbed or rubbed off when passing through the machinery hereafter described, than the coiled coverings of the ordinary bobbin-wires, or any other description of covering hitherto employed for that purpose. As the liability of the wires to come into contact, and thereby disturb the electric circuit, is greatly diminished by braiding their surfaces, the patentees consider this mode of protecting the wires as one of great importance in the construction of electrical conductors.

The wires so covered are to be introduced into and enclosed within a tube or pipe, composed of lead or other similar soft metal; which tube or pipe is filled with asphalte, pitch, wax, resin, or other substance, being a nonconductor of electricity, and capable of being liquified by heat, and afterwards becoming concrete by cold.

The wires being covered with thread, as above mentioned, are prevented from coming into contact with each other, or with any adjacent conducting medium which might divert the course of the electric fluid; and the spaces between the covered wires being filled with pitch or other suitable nonconductor of electricity, as before mentioned, and enclosed in pipes or tubes of lead, or other similar soft metal, the wires will be effectually preserved in an insulated state, and protected from damp as well as from other sources of injury.

The means of manufacturing the improved electric conductors will be best understood by reference to the drawings in Plate XVII. Fig. 1, is an elevation, partly in section, of a machine for effecting this object. *a*, is a cistern or vessel, formed of iron or other suitable material, for containing the bituminous or resinous matters which are intended to surround the wires in the leaden pipe; *b*, represents a tubular or hollow rod or mandril, open to and descending from the bottom of the vessel *a*; which mandril is preferred to be made of polished steel, and fixed, by means of flanges and screw-bolts, to a triangular plate or head *q*. *c*, is a tubular core at the lower end of the mandril *b*, also made of polished steel; and *d*, *d*, is a circular hollow die, resting on the top of the ram *e*. The ram *e*, is cylindrical, having a perpendicular opening through its centre; the lower part of the ram is enlarged at *f*, with a transverse slot through it, and is bolted firmly upon a triangular plate *s*. *g*, is a piston, working in the hydraulic-cylinder *i*, having a projection or enlarged diameter *h*, to be packed with leather or otherwise, so as to fit the cylinder *i*, accurately. This cylinder is of cast-iron, bored, and lined with copper, and is bolted to the ground; *k*, is a ring or cap-plate, over the end of the cylinder, embracing the smaller diameter of the piston *g*, which is to be properly packed; *l*, is a malleable iron cylinder, having a chamber *m*, within it, and an aperture to admit the sliding tubular mandril *b*; it is also provided with a small opening at *o*, for filling the chamber *m*, with lead or other soft metal. *p*, *p*, are pillars, fixed upon the plate *q*, and intended to support the cistern or vessel *a*; the plate *q*, has an aperture in its centre to admit the tubular mandril *b*, shewn in the drawing. *r*, *r*, are three sliding-rods (two only are shewn in fig. 1,) which pass through the snugs or ears of the plate *q*, and are fastened thereto by nuts; their other ends are attached in the same way to the plate *s*. These rods pass freely through a heavy circular plate *v*, which, by means of a ring-plate bolted to its under surface, supports the cylinder *l*; a ledge or belt being provided at *x*, to rest upon the inner edge of the plate *y*. *z*, *z*, are six iron pillars, with screw-nuts at their ends, for binding the plate *v*, to the cylinder *i*.

The covered wires which form the electric conductors *a*, are intended to proceed from reels, placed in convenient situations (but which reels are not represented in the drawings), and pass through the vessel *a*; the reels should be loaded with a weight or drag to keep the wires always at a certain tension.

The relative position of the hollow circular die *d*, *d*, with regard to the tubular core *c*, of the mandril, will be clearly seen in fig. 1. The core *c*, is screwed into the tubular mandril *b*, and is tapered off and terminates before it reaches the most contracted part of the opening in the hollow circular die *d*.

The mode in which the machine operates is as follows:—The wire or wires, covered as before described, are introduced into the machine through the vessel *a*, where they become coated with pitch or other similar material. They are then brought down through the tubular mandril *b*, the hollow core *c*, the hollow circular die *d*, and the tubular ram *e*, to the opening at *f*, where they issue from the machine. The asphalte, pitch, wax, resin, or other nonconductor of electricity, capable of being liquified by heat, and afterwards becoming concrete by cold, is put into the vessel *a*, and brought to a liquified state by means of heat applied to that vessel. The liquified pitch, or other similar substance, will descend into and fill the tube of the mandril *b*, and the hollow core *c*, and during its passage down the said mandril, the pitch or other matter will remain in a liquified state. The chamber *m*, of the hollow cylinder *l*, is filled with lead or other similar soft metal, introduced in a molten state through the opening at *o*. The metal in this chamber is to be forced therefrom by the action of the hydraulic ram, when in either a heated or cold state; but the patentees prefer to operate upon it in a heated though solid state, varying from 250° to 400° of Fahrenheit's thermometer. This degree of temperature may be preserved in the cylinder by any convenient means.

When the chamber *m*, is filled with lead or other metal, the said mass of metal will assume the form of a thick hollow cylinder or tube, of which the mandril *b*, and the core *c*, form the centre.

The cylinder *i*, and piston *g*, constitute a common hydraulic press, and water being forced into the cylinder *i*, at the opening *w*, below, by means of force-pumps in the usual way, the piston *g*, will be made to ascend, and with it the ram *e*, and the whole of the superstructure attached to the plate *q*. As the ram ascends, it will force the hollow circular die *d*, against the mass of the lead or other metal in the chamber *m*, which, having no other outlet than the channel between the core *c*, and the hollow circular die *d*, the thick cylinder of lead in the chamber *m*, will be forced into the form of a small pipe or hollow tube, and descending through the tubular ram *e*, will be delivered finished at the opening at *f*, with the wires firmly secured and enclosed within it.

When the charge of lead has been pressed out of the chamber *m*, it is again to be filled with melted lead or other metal, to be operated upon in the same manner, and the charge repeated, until a proper length of tube is produced.

The metal being hot when it is poured in, will amalgamate with the remaining metal of the previous charge, so that one continuous perfect tube will be formed.

Previously to commencing the operation of forming the pipes, the wires must be carried down to the opening at *f*, and when the first portion of the pipe is produced, it must be made fast to the wires; the further operations will then draw down the wires from the reel or coil, through the pitch vessel *a*, and tubular mandril; so that the pipe or tube, during its whole formation, will always have the wire or wires and the non-conducting material enclosed within it.

The screws at each end of the rods *r*, and corresponding nuts, are intended for adjusting the mandril and die. The vacancy formed in the cylinder *i*, between the projection *h*, in the piston *g*, and the ring *k*, is to admit of water being injected through a small opening by force-pumps, for the purpose of accelerating the descent of the piston.

Figs. 2, 3, and 4, represent various views of another construction or arrangement of machinery, which is a modification of the one above described; for although the arrangement of the parts is somewhat different, the principle upon which both machines are constructed is the same, and the effect produced is identical in both. Fig. 2, represents the machine in vertical section. As many of the parts in both arrangements are the same, their situation only being changed, it has been thought unnecessary to give a detailed description of this machine; but similar letters of reference are employed to denote the corresponding parts. *a*, is the cistern or vessel, formed of iron, containing the asphalte, pitch, or other bituminous or resinous matters; *b*, is the hollow mandril; *c*, the hollow core, and *d*, the hollow circular die.

The hollow mandril in this machine is made of much greater length than that in the first described machine, and the position of the core and die is consequently changed. *l*, is a malleable iron cylinder, furnished with a hollow chamber *m*, as before described, for containing the molten lead or other soft metal, which is poured in at the top, by raising the ram or plunger *e*, out of the chamber. In this machine the hollow mandril and the die do not move up and down with the other moveable parts, but are stationary, and only so far moveable as to allow of their proper adjustment. The die *d*, is placed in a recess made at the bottom of the malleable iron cylinder *l*, and is secured therein by means of a plate *d**, bolted to that cylinder. *i*, is the large water or hydraulic cylinder, lined with copper, its upper end being closed by a cover or lid, which is firmly bolted down by screw-bolts, as shewn in the drawing; and through this cover passes the hollow mandril *b*, surrounded by a strong tube *n*, which is, in fact, a prolongation of the piston *g*, and is similar in appearance to a piston rod, for the purpose of protecting the hollow mandril from injury. The hole through which the tube *n*, passes is furnished with a good secure packing, so as to make it watertight. The piston or plunger *g*, works in the water cylinder, and by means of the enlarged diameter of the plunger at *h*, and the contracted or smaller diameter of the cylinder at *k*, an annular space round the plunger is produced, and by forcing water therein the plunger is raised when required. In order to reduce the weight of the plunger, hollow spaces are made therein, as shewn in the figure.

The ram *e*, is firmly bolted to the lower end of the piston or plunger *g*, and the hollow mandril *b*, which, at this part, is contracted in diameter, is passed through it. The lower end of the ram *e*, is furnished with a steel plate, which accurately fits the chamber *m*. The cylinder *l*, is suspended in a strong circular plate *v*, firmly secured to the frame-work, and is prevented from moving from its seat by means of a ring *y*, which is bolted to that plate. *q*, is a circular plate, supported from the top flange of the hydraulic cylinder *i*, *i*, by means of rods, and has an aperture in its centre, through which the hollow mandril *b*, passes; *j*, is another plate, supported above the plate *q*, upon vertical worm-shafts *a**, *a**, which pass through holes made in the plate; and to the centre of this plate *j*, the hollow mandril *b*, is secured in such a manner that by moving the said plate *j*, up and down, the hollow mandril is moved also in a corresponding ratio. The vertical worm-shafts *a**, *a**, each carry a toothed pinion *b**; and upon a horizontal shaft *c**, mounted in bearings on the plate *q*, are small endless screws or worms *e**, *e**, which gear into the pinions *b**. When the pinions *b**, *b**, are made to revolve, the worm-shafts *a**, *a**, will raise or lower the plate *j*, and, consequently, the tubular mandril *b*, to which it is secured. By this contrivance the distance between the core *c*, and the die *d*, is regulated, and, consequently, the thickness of the pipe is determined with the greatest nicety. It will sometimes happen that the core gets out of the centre of the opening of the hollow circular die; and when such is the the case, a tube of unequal thickness must necessarily be produced. To remedy this evil, the opening of the hollow circular die *d*, is made a little out of the centre of the cylinder *l*, and it is placed in a ring, the internal diameter of which is not concentric with the external diameter or periphery; and when the die is placed in its proper position, if it requires adjustment, so as to bring the core over the centre of the opening, this is easily effected by merely turning the circular hollow die and its excentric ring round in opposite directions, until the adjustment is complete. Figs. 3, and 4, represent in plan and section this mode of mounting the hollow circular die *d*.

The mode of operating with this machine is very similar to that first described,—it will not therefore be necessary to enter into any details in reference thereto.

The wires being enclosed in tubes or pipes, filled in the manner aforesaid, may be laid down or otherwise used, either above ground in the open air, or underground, or below the surface of water; and when so constructed, according to this improved method, will present outwardly the appearance of a common leaden or soft metal pipe. The improved conductors may be manufactured, by the machinery and means described, in long lengths, and may be rolled upon reels.

If the electric conductors are to be used in great lengths on land, it is proposed to carry them on reels, on a wheeled carriage; and while the pipe is being laid down, one end is to be held fast, as the carriage proceeds in the direction in which the pipe is to be laid, so that the reel may revolve on its journals or centres, and thereby allow the pipe containing the wires to be unwound and delivered on the ground, without risk of injury, and with great facility.

Should the conductors be required to be laid in water, it would be advisable to employ a floating vessel, propelled at a suitable speed, by drawing upon ropes or chains, made fast to the bottom or banks; or by steam-boat machinery, applied so as to regulate the speed.

When the electric apparatus is laid down or used on land, it may be laid in a trench made in the ground; and at regular or convenient distances, the ends of the pipes should be raised above ground, and placed in a cast-iron or other suitable case or box, provided with a lock or other means of safe keeping, so that the wires may be easily accessible to the examination of parties wishing to communicate intelligence by them. The ends of the individual wires may also be disconnected from each other in these boxes, and the circuit with the corresponding wires belonging to the adjoining tube completed, when required, by means of small pinching screws, or by causing the ends of the wires to dip into a hollow space, filled with mercury, or an amalgam of that metal, so as to produce metallic contact, in order that the conductors may be so joined as to form a continuous length to any extent, but capable of being disconnected when required.

For this purpose the patentees propose to employ an apparatus, shewn in plan view at fig. 5, which represents the terminations of two pipes of soft metal, each containing three conducting wires *a, b, c*. The ends of these wires extend beyond the termination of the pipes, and are bent downwards into cups of mercury *g, h, i*. By this means the connection of the conductors is restored through the mercurial medium; that is, the conductor *a*, by its end being immersed in the cup *g*, communicates with the wire *d*; and the wire *b*, in the cup *h*, communicates with the wire *e*; and the wire *c*, through *i*, with *f*; connection is also made with the outsides of the pipes A, and B, by thick wires *k*, and *l*, soldered to the pipes, which are made to communicate through the mercurial cup *m*. This apparatus, placed at any desired part or parts of the line of communication, may be enclosed in a box *n*, and locked up securely.

The improved electric apparatus may be used not only as conductors for telegraphs, either by land or water, but also for firing mines, or other purposes for which electric conductors have been or may hereafter be employed. It is likewise proposed to use the leaden or other aforesaid metallic pipes or tubes, as means of returning the electric currents conveyed by the metallic wires enclosed in such pipes. Metallic contact is produced through the whole length of these tubes, so as to complete the electric circuit, either by soldering a piece of copper or other metal to each end of the leaden tubes, and bringing these pieces of copper or other metal into metallic contact through the mercury, or by other means, as above said.

When the conductors are used for electric telegraphs, these ends and the wires enclosed therein are attached to the wires proceeding from the clockwork of such telegraphs, in the usual way; but which may vary according to the construction of such telegraphs.

If the conductors are to be employed for igniting gunpowder, a short piece of metallic wire, of small diameter, may be placed in any convenient situation, so as to form a part of the electric circuit; and if the electric current be sufficiently powerful, this small wire will be made hot enough to ignite gunpowder, when a current of electricity passes along the wires.

The patentees, in conclusion, state, that they do not intend to claim the adaptation of wires, surrounded with nonconducting substances, enclosed in tubes for electric conductors; but that which they do claim is, the construction and manufacture of electrical conductors, by the employment of machinery having a tubular mandril or hollow rod, through which wires may be drawn, whilst the leaden or other soft metal tube is forming, by pressure between a core and die; such wires being at the same time imbedded in pitch or other nonconducting material.—[*Inrolled in the Petty Bag Office, February,* 1846.]

To CHARLES KEENE, *of Sussex-place, Regent's-park, Esq., for improvements in boots, shoes, gaiters, overalls, and other like articles of apparel.*—[Sealed 29th May, 1845.]

THIS invention, which is divided into eight parts, consists in rendering boots, shoes, gaiters, overalls, and other articles more or less weather and water-proof, and more easy of wear, by the application to the same, or the making of the same, wholly or in part, of the substance called gutta-percha, and sometimes gutta-tuban.

The first improvement consists in coating the pieces of leather or other material, of which the boots, shoes, or other articles are made, upon one or both sides, with a solution of gutta-percha, either alone or mixed with caoutchouc, sulphur, coloring matter, or any other substance calculated to improve the quality of the solution, as explained in the specification of a patent obtained by Richard Archibald Brooman, March 11, 1845*; one, two, or more coats being applied, according to the thickness of coating required. Sometimes, instead of coating the whole of the pieces, only those are so treated which are likely to be most exposed to the weather and moisture, such as the outer sole and upper leathers.

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* For description of this invention see page 235, of the present volume.

The second improvement consists in protecting the pieces of leather or other material by covering them, on one or both sides, with a layer or layers of gutta-percha in the plastic state, or of gutta-percha combined in the plastic state with caoutchouc, sulphur, coloring matter, or French chalk, or other soft powder, as described in the specification of Brooman's patent.

In the third improvement, instead of the materials being coated or covered as above described, pieces of gutta-percha, in any of the sheet states described in Brooman's specification, are interposed between different portions of the materials, such as between the outer and inner soles, or between the upper leathers and lining.

The fourth improvement consists in manufacturing boots, shoes, gaiters, and similar articles, wholly or partly, of a compound fabric, made, as described in Brooman's specification, by adding to gutta-percha, while in the kneading machine (and whether combined or not with caoutchouc, sulphur, coloring matter, or French chalk, or other soft powder), a portion of leather-dust, hair, bristles, ground cork, woollen shearings, or other membranous or fibrous substance, in a finely comminuted state.

The fifth improvement consists in making boots, shoes, and similar articles, wholly or partly, of a fabric described in Brooman's specification, and made by saturating a fleece or bat of cotton, wool, or other fibrous material, with a solution of gutta-percha, or of gutta-percha and caoutchouc combined; and the present patentee prefers to add some sulphur and coloring matter to the solution.

The sixth improvement consists in manufacturing boots, shoes, and similar articles of gutta-percha, or a mixture of gutta-percha and caoutchouc, either sulphurized or not, and all in one piece, by casting the same in cored moulds. The patentee either fills the mould with the material in a state of hot solution, and allows it to cool; or he fills the mould with the material in a granular state, heats the mould until the material is brought to the state of pulp, and then leaves it to cool. Sometimes, instead of employing a cored mould, the patentee uses a single matrix only, and causes the material, in a sheet or plastic state, to assume the shape of the matrix, by forcing it into the recesses thereof by the pressure of water or air. When a greater degree of elasticity is required to be given to the boot or other article, the patentee casts it in two or more pieces (for example, the front part in one piece, and the back part in another piece), and unites the parts by an interposed piece or pieces of leather, or of gutta-percha, in the sheet and sulphurized state, or some other flexible material.

The seventh improvement consists in uniting the different parts of which boots, shoes, or other articles are made, when any two of these parts, or any one of two parts, are or is composed of gutta-percha, or a mixture of gutta-percha and caoutchouc, in any of the sheet states, by passing a hot iron over the joints, by which means the two surfaces are made to adhere firmly together.

The eighth part of this invention relates to boots, shoes, gaiters, and other articles, made of unsulphurized caoutchouc in the ordinary manner; and consists in improving the same in point of smoothness of texture and capability of resisting variations of temperature, by exposing them, for from 30 to 60 minutes, to the fumes of sulphur, in a close vessel, heated to a temperature of from 210° to 250°, or by immersing them in a bath of melted sulphur for the same length of time. In either case, in order to prevent the articles from sticking to one another, they are covered with a paste made of French chalk, flour, and water, which is allowed to dry before they are submitted to the action of the sulphur. Boots, shoes, and other articles, made wholly or partly of unsulphurized gutta-percha, may be treated in the same way; but the patentee prefers to incorporate the sulphur with the gutta-percha in the first instance.

The last part of this invention consists in improving the shoes of horses, by laying upon and securing to the upper part of the same a sheet or layer of sulphurized gutta-percha, or of sulphurized caoutchouc, or by making the same wholly of either of the said materials. In the former case, the layer of gutta-percha or caoutchouc may be rivetted to the shoe, before it is applied to the foot; or it may be laid loosely between the shoe and foot, when the horse is being shod, and secured by passing the nails through it.

The patentee claims, Firstly,—the coating and covering, either wholly or partially, of the pieces, from which boots, shoes, gaiters, overalls, and other like articles of apparel are made, with gutta-percha, in any of the states of preparation or combination before specified, and as before described. Secondly,—the interposing of gutta-percha, in any of its sheet states, between other materials, in the making of boots, shoes, and other articles. Thirdly,—the employment, in the manufacture of boots, shoes, and other articles, of the two compound fabrics described under the fourth and fifth improvements. Fourthly,—the making of boots, shoes, and other articles all in one piece, or in two or more pieces, by casting, as before described. Fifthly,—the uniting of the parts of boots, shoes, and other articles, when any two parts or any one of two parts are or is composed of gutta-percha, in any of its states of preparation or combination, by cementing, instead of sewing or stitching them together. Sixthly,—the sulphurizing of boots, shoes, and other articles, when made of unsulphurized caoutchouc or of unsulphurized gutta-percha, as above described. Seventhly,—the improvement of the shoes of horses by the addition thereto of sheets or layers of sulphurized gutta-percha or sulphurized caoutchouc, as above described, or by making the same wholly of either of the said materials.—[*Inrolled in the Inrolment Office, November*, 1845.]

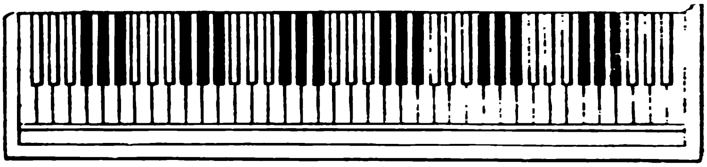
Scientific Notices.

IMPROVED ARRANGEMENT OF KEY-BOARD FOR PIANO-FORTES.

BY M. DE FOLLY.

Among the subjects for rewards at the recent distribution of the Society of Arts, the contrivance by M. de Folly, of what he terms the geometrical piano-forte, claimed, from its ingenuity and apparent simplicity, considerable attention. It is well known that the difficulty of attaining anything like proficiency as a performer on the piano-forte arises from the fingering in every key being differently arranged, to suit the varying distance and relative position of the notes from the dominant or leading note. The desirableness of having a key-board, which will enable the performer, from learning one arrangement of fingering, to play in all the ordinary keys, will be evident to every one acquainted with the subject; and this M. de Folly proposes to effect by his new arrangement of key-board. Whether or not he has over-rated the value of his invention to the student, by the great economy in time it is likely to effect, is a question that may admit of dispute; but that this key-board will facilitate the acquisition of proficiency on the piano-forte has been admitted by gentlemen of high standing in the art.

The improvement consists in making the lower row of keys to strike whole tones from one end of the board to the other, instead of having semitones between B, C, and E, F, as is usual; the upper row of keys also consists of an uninterrupted series of whole tones, which are semitones to the lower row of keys; but in order to prevent confusion, the upper row is divided into alternate sets of three white and three black keys. The mode of running up the scale in any one key is uniform with all the others, and is as follows:—Upon whatever note the player commences, he strikes first three notes of that row; then, to get the semitone, he goes to the other row, and plays four notes; after which, he returns to the row from which he commenced, thereby producing the second semitone;—for instance, in order to play the scale of C, he commences on the first white note of either of the sets in the upper row (see the accompanying diagram), and plays the three white notes of that set; then, for the semitone between E, F, he descends to the lower row, and plays four notes below; then, to complete the octave, he rises to the upper row, and finishes on C, or the first white note of the set above where he commenced, thereby producing the semitone between B, C, as required. The arrangement is precisely the same in all the keys; so that upon whatever note the player commences the scale, whether on the upper or lower rows of keys, he plays first three notes, then four notes of the other row, and of course finishes on the eighth note above, and on the same row of keys where he commenced.



The advantages of the instrument over the old one are stated by the inventor to be as follows:—

The piano-forte is geometrical, and the intonations are in exact proportion with the distances of the keys; that is to say, between every two whole tones, there is a semitone throughout the whole key-board.

The object of these geometrical proportions is to establish an equality of fingering, and when the fingerings in the keys of C, and G, are acquired, it enables the performer forthwith to play in all the other keys.

By the immense facility afforded to the execution, and the *octave* being much shorter, which enables an ordinary hand to reach the tenth, and by having a greater quantity of keys at command, new effects can be produced that were never thought of before, as all chromatical calculations are most easy of performance, which to students of harmony will afford immense advantages.

The practice upon this piano-forte is far from being tedious, as it enables the student to modulate, although practising the same piece in different keys, which will be the means of early familiarising young beginners with modulations, and afford great pleasure to those capable of appreciating them.

The most abstruse music will also be so easy of performance, that piano-forte players, instead of passing their lives in the practice of Scales and Exercises, may better employ their time in acquiring a knowledge of the highest order of music; and for transposition, as only two different fingerings are employed for all the scales, the principal difficulties are obviated, and the necessity of employing transposing piano-fortes is done away with.

The advantages of this new piano-forte to the public at large will be found in the great saving of time and expense of learning, as a pupil will acquire as much in one year on this new instrument as in twelve years on the old one.

One of the principal objections to the instrument that would occur to a professional man would probably be, that as the key-board appears to be entirely altered, it would involve the necessity of commencing *de novo* to learn the instrument. This undoubtedly is the case, but we apprehend that the invention is intended more particularly for beginners, who, by means of the improvement, may be enabled to play without being obliged to learn twelve different modes of fingering, which are required for the old instrument. A second, and as it at first appeared to us almost fatal objection to the *commercial* success of the invention was, that whereas players on the old instrument cannot play on the new, an instrument constructed on the improved plan would be useless to any but those who had learnt on the new instrument. M. de Folly has, however, removed this difficulty, by arranging his key-board in such a manner that it may with the greatest facility be applied to an ordinary instrument; so that, in fact, the instrument may be furnished with two key-boards, one on the new principal and one on the old, either of which can be substituted for the other in a few minutes. We feel great pleasure in stating, that M. de Folly's invention having been referred by the Society of Arts to one of their committees to investigate the subject, and report upon the merits of the improvement, it was determined after a long and minute examination, in which several eminent professional gentlemen assisted, that the gold Isis medal should be presented to M. de Folly, as a reward for his praiseworthy exertions in bringing the piano-forte more within the capacity of ordinary players.

SOCIETY OF ARTS.

In announcing the 92nd annual distributions of prizes, awarded by this long established and useful society, for meritorious exertions in the polite and useful arts, it is with sincere pleasure we have to congratulate the friends of the Society upon its revivification, and the rapid strides that have been made within the last few years, to bring the Society back to the honorable distinction it formerly maintained, for so long a period among the literary and scientific societies of the metropolis.

Owing to mal-administration, and other causes, the Society had been gradually suffered to decline, until at length it was well nigh brought to the point of dissolution; but a few zealous friends who adhered to it, through good and evil report, determined, if possible, to save themselves and the public from the disgrace of allowing so eminently useful and long established a Society to languish and finally break up for want of support; and upon exerting themselves accordingly, they were enabled, by bringing back many of the old members, who had left it in despair, and by a large accession of new ones also, to infuse new life into the Society, and make various judicious alterations and improvements in its constitution and operations, the want of which had materially aided its decline. It is not our purpose here, to enter minutely into all the various improvements that took place, in consequence of the new order of things, but we may briefly mention, that one important improvement was, rewarding all useful and ingenious inventions in the mechanical or chemical arts, whether patented or not. By this alteration, the Society has been enabled to notice, and introduce to the attention of the public, many highly meritorious improvements, which will no doubt be found exceedingly useful.

A second very important step taken by the Society, has been, the offering of special premiums for various inventions, discoveries, and improvements in the mechanical and chemical arts, and also in different branches of manufactures. The result of such encouragement has been the production of various inventions and designs, which cannot fail of being extremely interesting to the friends and admirers of the Society. At the late distribution, which took place on the 12th ult., at the Society's Rooms, in the Adelphi, it was expected that Prince Albert, who is the President of the Society, would have taken the chair, as on the last year; but the secretary announced that, owing to an accident, His Royal Highness was prevented from attending, and it was feared would not be able to use any exertion for some days; Sir E. Codrington, therefore, officiated as chairman. It was stated by the secretary that the Prince had sent for the members of the council, who waited on him the evening before, at Buckingham Palace; and although he did so, as he said, to ask them for information, they found, in the course of their interview, that so far from requiring information from them, His Royal Highness was well qualified to give them many very valuable suggestions for the advancement of the objects and interests of the institution. Prince Albert especially pointed out that it should be the aim of the Society to encourage as much as possible, by prizes and every other means in their power, a taste for the arts and sciences amongst the great mass of the people, so as to induce them to improve their own domestic comforts in their habitations, furniture, and other requirements. He also suggested that a prize should next year be offered for the best slab of green marble from the county of Kerry, as it was well known that there, and in several other parts of Ireland, there were mines of the finest green marble, which could only at present be procured from foreign countries, at great cost; and that this encouragement would be likely to lead to the ultimate working of those mines which were now totally neglected.

His Highness Ibrahim Pacha, accompanied by his interpreter and three others of his suite, was present on the occasion; and as he entered and took his seat on the left of the chairman, was warmly greeted by the company. The chairman said, he feared he should be found but a bad substitute for their royal president, whose absence, they had all just heard with regret, was caused by an accident. He should, however, endeavour to discharge the duties of the day to the best of his ability; and he was rejoiced, as he was sure they all were, to see by his side a prince for whom, although he had formerly been opposed to him in hostilities, he entertained the highest respect and esteem, not only on his own account, but as the son of that liberal and enlightened man to whom this country, and all Europe, was indebted for his encouragement of everything that could tend to benefit and advance the interests of mankind. The secretary then read the annual report, which gave a highly favorable account of the success and progress of the society in the advancement and encouragement of every branch of art and science; with a detail of the objects for which the special premiums were proposed; one of which was of a most important character at the present time, namely, the manufacture of bread from Indian corn at so cheap a rate as to lead to its introduction into Ireland as a substitute for potatoes. The introduction of this food had met with great prejudice and opposition in Ireland, and chiefly so among the bakers; but, greatly to the credit of Mr. O'Brien, a baker of Dublin, who rising above all prejudice or selfish feeling, had applied himself to the amalgamation of Indian flour with other ingredients, an excellent wholesome and nutritious bread was produced at 1d. a pound, and for his exertions in this respect the Society had awarded to him the large gold medal. The Pacha seemed much pleased with the ingenuity of Mr. Ricardo's machine for registering the speed of railway trains, which was one of the inventions first rewarded, and also appeared highly interested and amused when the infant daughter of M. de Folly sang one or two little ditties, and accompanied herself on the improved pianoforte, for which M. de Folly was rewarded by the Society with the gold Isis medal. Special premiums were awarded to Messrs. Minton and Co., for beautiful models of cheap wash-hand services for cottages, and earthenware jugs; and also to Mr. Summerly, for models of cheap earthenware tea services, specimens of which were exhibited, and the whole service, in beautiful ware, could be placed on the cottage table for 4s. The chairman, upon distributing the prizes to the various successful candidates, as below, addressed each, as he presented the prize, in complimentary terms on the triumph and honor they had achieved. The various inventions were described and explained by the inventors, in the course of which the Egyptian Prince paid great attention to the proceedings, and through his interpreter made many inquiries, to acquaint himself with the uses and application of each. He paid especial attention to a revolving water-carriage, the invention of Mr. Turner, adapted for the conveyance of water with the greatest facility over difficult ground, and particularly over sandy deserts; and also to Dr. Ritterbandt's method of preventing incrustation in steam-boilers, the simple remedy being the introduction of a small quantity of muriate of ammonia in the boiler. Before the distribution was completed, the chairman said that it had just been communicated to him that his Highness the Pacha was about to retire, and Mr. Rotch, a member of the Society, said it was the unanimous desire of all the members and of the council then present, although it was an unusual proceeding, that they should, on this occasion, step out of their way, by electing his Highness Prince Ibrahim Pacha, an honorary member of the Society, in testimony of the sense they entertained of the favor he had that day conferred upon them by his presence, and of the encouragement which his father and himself gave in their own country to all that could forward the advancement of arts, sciences, manufactures, and general improvements. Mr. Rotch, therefore, moved that His Royal Highness be elected an honorary member of that Society. Dr. Roget seconded the motion, and it was passed with acclamation, and the result communicated to the Prince by the Chairman, through the interpreter. The Prince, by his interpreter, expressed his warm acknowledgments for the honor conferred upon him by the Society, the objects of which, as well as all other peaceful and civilizing improvements, he would at all times forward and encourage in his own country; and concluded by saying, that, with respect to the gallant chairman, he was delighted to meet him on that peaceful and refined occasion, and, as to any feeling of unkindness towards him, it was impossible he could harbour any such, as an evidence of which he begged to tender his hand. His Highness here shook hands most cordially with the chairman, and then retired with his attendants amidst universal and cordial cheering. The distribution was then resumed, and continued till the whole of the prizes were given away.

The following is a list of the prizes distributed on this occasion:—

IN AGRICULTURE AND CHEMISTRY.

To Mr. T. O'Brien, of 7, Leinster-street, Dublin, for his exertions in the manufacture of bread from Indian-corn, which have contributed materially to its introduction as a substitute for potatoes among the people of Ireland, *the large gold medal.*

IN MECHANICS AND MECHANICAL ARTS.

To M. Ricardo, Esq., of Brighton, for his machine for registering the speed of railway trains, *the gold Isis medal.*

T. M. de Folly, Esq., of 29, Harrington-street, Hampstead-road, for his improved key-board for the piano-forte, *the gold Isis medal.*

T. R. Crampton, Esq., C.E., of 18, Sussex-place, Kensington, for his improvement in the construction of the locomotive steam-engine, *the gold Isis medal.*

Mrs. Varley, of Charles-street, Clarendon-square, for her method of ventilating rooms without cold currents or complex apparatus, *the silver medal and £5. 5s.*

Mr. Joshua Jeays, of 9, Green-street, Marlborough-road, Chelsea, for his orthogonal system of hand-railing, *the silver medal.*

H. Lawson, Esq., of Bath, for his meteorological thermometer stand, *the silver medal and honorary testimonial.*

Dr. R. Green, of Dunkitt House, Waterford, for his equatorial telescope stand without a polar axis, *the silver medal and honorary testimonial.*

Reginald Orton, Esq., of Villiers-street, Sunderland, for his new life-boat and life-buoy, *the silver medal.*

Mr. T. Falconer, of 10, Park-street, Limehouse, for his improved plough for carpenters, joiners, &c., *the silver medal and £5.*

Mr. W. G. Gover, of 8, Chester-square, Pimlico, for his patent removable window-sash, *the silver medal.*

Mr. G. Turner, of the Swan-inn, Bayswater, for his revolving water carriage, *the silver medal and £3.*

Lieut. H. M. Tylden, R.N., of Wellington-street, Woolwich, for his method of stopping shot holes below the water line in iron ships, *the silver medal.*

Mr. R. Rettie, C.E., of 7, Ely-place, Holborn, for his tidal harbour lamp, *the silver medal.*

Mr. H. B. Cowell, of 4, Compton-street, Ball's Pond, for his improved ball tap for cisterns, *the silver medal.*

Mr. J. E. M'Douall, 22, Tavistock-street, Covent Garden, for his improved archimedean screw drill, *the silver Isis medal.*

Rev. J. Edwards, M.A., of King's College, London, for his improved razor strop, *the silver Isis medal.*

Mr. G. Scott, of 13, Fletcher's Row, Clerkenwell, for his apparatus for drilling and tapping gas and water pipes, *the honorary testimonial and 5l.*

Mr. C. Maiben, of 4, Castlenau-terrace, Barnes, Surrey, for his shifting flaps for saddles, *the honorary testimonial.*

Mr. Adolphus Loewe, of 55, Mansell-street, Goodman's Fields, for an improved double letter-clip, *the honorary testimonial.*

Mr. W. Stidolph, of 14, Dover-place, New Kent Road, for his improved writing instrument for the use of the blind, *the honorary testimonial.*

Mr. D. Middleton, of 9, Bail Gate, Lincoln, for his self-sweeping chimney pot, *the honorary testimonial.*

IN FINE ARTS.

To Felix Summerly, Esq., of 12, Old Bond-street, for his models of a cheap earthenware tea service, in one colour, *the silver medal and 10l. 10s.*

Messrs. Minton & Co., of Stoke-upon-Trent, for their models of earthenware jugs, *the silver medal and 10l. 10s.*

Messrs. Minton & Co., of Stoke-upon-Trent, for a cheap service for a washhand stand for cottages, *the silver medal.*

Mr. R. P. Pullan, of Longsight, near Manchester, for an original design for a cover of a bible, *the silver medal and 10l. 10s.*

Mr. T. H. Wilson, of 1, Lowther Arcade, Strand, for a design for a ticket of admission to the Society's rooms, *the gold Isis medal.*

There were also several other highly meritorious specimens of Art under this class, which were rewarded with various prizes. Many of these were the performances of young artists, who give evidence of talents of which England may some day have reason to be proud.

IN CHEMISTRY.

To Dr. Ritterbandt, of 9, King William-street, Strand, for his method of preventing incrustation in steam boilers, *the gold Isis medal.*

IN MANUFACTURES.

To B. Albano, Esq., C.E., of 24, Essex-street, Strand, for his patent cannabic composition, *the gold Isis medal.*

Mr. G. Warriner, of 60, Fenchurch-street, for the preparation and importation of essence of beef from Australia, *the gold Isis medal.*

Mr. G. Franchi, of 69, Myddleton-street, for the best imitation of ivory in plaster composition, *the silver medal and 5l. 5s.*

Mr. Waterhouse, of Chesterfield, for improvements in machinery for the manufacture of lace, *the silver medal.*

Mr. Bashford, of Bengal, for his specimen of silk from the Surdah Filature, *the silver medal.*

Mr. H. Page, of 8, Bishopsgate-street Without, for his patent oil integument or skin of paint, *the silver medal.*

Mrs. Collet, of 2, Britannia-terrace, King's-road, Chelsea, for her new description of hearth-rug, *the silver Isis medal.*

Mrs. Whitby, of Newlands, near Lymington, Hants, for her persevering exertions in rearing the silkworm in England, *the honorary testimonial.*

ON THE MANUFACTURE OF GAS FOR ILLUMINATION FROM WATER.

BY M. JOBARD.

[*From the Bulletin du Musée de 'Industrie.*]

A CERTAIN quantity of carburetted hydrogen gas, suitable for illuminating purposes, may be produced by the distillation of coal, resin, fatty matters, and oils; but at the same time, a considerable quantity of hydrocarburets of hydrogen is produced in the form of tar, naphthaline, paraphine, pyrogenous oils, &c., which are deposited in the apparatus, either in a liquid or solid form.

Now these substances, which are rendered useless and injurious to the manufacture of the gas, by the present mode of operating, are precisely those which are the most rich in illuminating properties. It has, therefore, been proposed to dissolve these hydrocarburets in hydrogen gas possessing no illuminating properties, and thereby rendering it capable of affording light, as the carbon is the source of the illuminating power. The whole of the year 1833, was devoted to experiments for this purpose, and to the production of apparatus for charging with carbon the hydrogen gas produced by Dobereiner's lamp.

These experiments were successful beyond expectation, and the result was laid before the Royal Academy of Brussels, upon which they appointed a commission to enquire into it, by whom the following report was presented in the sitting of 4th January, 1834:—

"The commission appointed at the last meeting, to examine the effect of the lamp constructed by M. Jobard, now presents its report, from which it appears that the commissioners are convinced that the gas burnt with a very white and brilliant flame (equal to 36 candles of six to the pound), and that, being desirous of ascertaining its illuminating power, by a comparison of the shadows, they find that the light of this gas, issuing from a 12-hole Argand burner, is at least double that of the coal-gas furnished by the Brussels Gas Company when burnt in a 12-hole Argand burner, pierced with holes three times the size, which are employed for lighting most of the shops in this town. These observations appear completely to answer the qustions put by M. Jobard to the Royal Academy.

"In order fully to appreciate his invention, it should be worked on a large scale, and an account kept of the economy effected, which he could not communicate to us without making us acquainted with his mode of operating, and which he wishes to keep secret."

The commission being desirous of seeing this invention worked on a larger scale, I had a gasometer constructed, and burners placed in every apartment in my house; a single burner was sufficient to light the largest room brilliantly, and a saving of several centimes was effected for each burner: this resulted from sulphate of iron being produced during the operation. The gas was charged with carbonaceous vapours by passing it through a cylinder containing about two quarts of oil of gas-tar, which was not exhausted at the expiration of eight days, during which time the experiments were continued. I think it right to enter into all these details for the benefit of those persons who might feel desirous of taking up this invention, which is on the eve of becoming public property.

Some doubt still remained as to whether the gas would retain the illuminating power after being confined in gasometers and traversing a considerable length of pipe; it appeared to me that very likely, in winter-time, the carbon mechanically combined with the gas, might become disengaged and deposited.*

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* This was the case in winter-time at St. Vallier, near St. Etienne, in the manufactory of Messrs. Chareten and Son, lighted by 240 burners.

The following fact, contained in Thenard's Treatise on Chemistry, was sufficient to put me in the right path:—*Gases combine at the moment of formation.*

A brevet was taken by me in Belgium for the production of hydrogen gas, by the decomposition of steam in vertical retorts, filled with incandescent coke, and for uniting this gas, *at the moment of formation*, with hyper-carburetted gas produced by the distillation of fixed oils, or any other hydro-carburets. I afterwards went to Paris, where, by deed, I gave up my invention to Messrs. Selligue and Tripier, in consideration of the sum of 10,000 francs and a third of the profits, on condition that M. Selligue should pass as the inventor; and as such he received the large gold medals from the Society of Encouragement and the Academy of Industry.—He was about to receive the gold medal at the exhibition of 1839, and also the Cross of the Legion of Honor, for what Baron Thenard called *this splendid invention*, when I was summoned before a jury to declare the truth.

It was useless to dissemble before a jury composed of such men as Baron Thenard, Gay Lussac, Brongniart, Darcet, Dumas, Payen, &c. I simply shewed my Belgic brevet, our agreement, and M. Selligue's receipt. The case was not long in being decided; the Selligue gas, and also the Selligue system of sinking wells, which I had given up to him by the same agreement, were both deprived of their false name at once.

Mr. Selligue has, however, contributed his mite, for he constructed several horizontal furnaces, which would not work, before he adopted my vertical plan, and which worked successfully at Antwerp, the description of which will be given hereafter.

The towns of Dijon and Strasburg, and two of the fauboargs of Lyons and Paris had been for some time lighted with this gas, which, after being opposed for some time by powerful continental gas companies, was on the point of sinking into oblivion, when it was taken up in Dublin, and even in London.* It was with great pleasure I saw it come into use in that country, abounding with coal, as I thought it would only be used in those countries where coal is scarce and dear; a plan was then adopted in Paris, which I had previously proposed, and which consisted in causing gas obtained by the decomposition of water, to take up hydrocarburets produced by the distillation of coal gas, at the moment of its formation. Twice or thrice the quantity of illuminating gas could be obtained by this means than by the ordinary method. The illuminating power of ordinary gas might also be easily doubled by passing it through a vessel filled with carburets of hydrogen, slightly heated, as described in my brevet.

By combining pure hydrogen gas, at the moment of formation, with coal gas, charged with an excess of carbon, the necessity of purifying it is done away with, as the ammonia and sulphurets of hydrogen liberated are dissipated and lose their intensity; but by employing oil of schistus, or fish or other oil, any purification will be unnecessary: this is, therefore, another advantage.

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* Gas made from water was used in Dublin by Mr. Kelly, of Upper Gloucester-street; in London, by Mr. Stones, of 25, Golden-square; and under the arches of Waterloo Bridge.

Being desirous of making the public acquainted with the advantages of this new system, and not having any further interest in the matter, I think it right to state the reasons which were given in opposition to it, by publishing the report read by M. Arago, at a Meeting of the Academy of Sciences, December 3rd, 1838.

I will also refer to the Bulletin of the Society of Encouragement of the same year, for the report of Messrs. Dumas and Payen, in consequence of which, one of the grand prizes of the Society was granted to M. Selligue.

In the following year a patent was taken in England, in the name of M. de Val Marino.* About the same time this invention found its way into Austria, and fell into the hands of M. Offenheim, by whom it was offered for sale in Belgium to the inventor himself, with whom M. Offenheim was not acquainted.

To return to the explanations presented to the Academy of Sciences—they are as follows:—

Hydrogen gas is charged with carbon by passing it through a hollow cylinder, *heated to redness*, where it meets with highly carburetted oils. A chemical combination, and not merely a mixture, then takes place, as is proved by the analysis of M. Peligot, Professor at the Polytechnic School, which was as follows:—

Carburets of hydrogen - -	57
Oxide of carbon - - - -	28
Free hydrogen - - - -	15
	100

The theoretical question of illumination is therefore as follows:—

"*What is the process which will produce the largest quantity of light from* 1 *lb. of either oil, resinous matter, schistus, or coal-tar?*

"One pound of oil of resin or schistus produces in the new apparatus 35 cubic feet of gas, 3 feet of which are burnt in an hour in a burner giving a light equal to ten candles, which is equal to 23 hours light. Now, at Belleville, Antwerp, Frankfort, and wherever gas has been manufactured from *oil of resin*, and from pure resin, the average quantity produced was from 7 to 9 feet for every pound of oil, but in three or four days it fell to from 6 to 8 feet. Separate experiments with new retorts may furnish from 12 to 13 feet, and the production of this quantity has been announced by M. Tailleberg as a grand discovery. Let us take this quantity, although it is nearly double the average;—two feet and a half of this gas must be burnt per hour to furnish a light equal to ten candles, according to a report upon the lighting of the town of Antwerp in October, 1837, with resin gas, and in October, 1838, with gas made from water. Let us only reckon 2⅓ feet;—1 lb. of oil therefore furnishes 6½ hours light, and admitting 17 feet for every pound to be the product, which cannot be obtained without the addition of water, it would even then only give 15 hours light, whilst the water-gas furnishes 23."

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* For a Specification of this Patent, see Vol. XVII., p. 99, of our present Series.

But there are other facts which can be proved without dispute. The production of gas from water does not stop at 35 feet per pound. By augmenting the quantity of water, with respect to the oil in the apparatus, the gas becomes weaker and weaker, until its density approaches and even exceeds that of coal-gas. In experiments made with more than 1500 cubic feet, and watched for several consecutive hours, the rate of production was 111 feet of gas for every pound of fish oil (oil of schistus produced exactly the same result).

It was only necessary to burn 6 feet of this gas in order to produce a light equal to ten candles, which was but in a very slight degree less brilliant than coal-gas. Gas produced at the rate of 55 feet per pound of oil of schistus gave a consumption of 4 feet in the same burner. Thus, supposing the water-gas to be produced at the rate of 80 feet to the pound, it is equal in power to the coal-gas, and burns but 5 feet per hour. One pound of oil will therefore give 20 hours light. Let us reckon the cost of this illumination with oil of schistus, which only costs about 2*s.* for every 100 lbs., and a consumption of combustibles which is diminished in proportion to the quantity of gas produced and the size of the apparatus; whilst, on the contrary, with resin gas, as the decomposition of the gas takes place on the surface of the metal, the small retorts are the most advantageous; and, at the same time, the mass of gas produced is not augmented, but simply its volume, and this only by decarburating the richest portion of the carburets of hydrogen by the action of a higher temperature.

The indefinite augmentation of the light obtained from the water-gas, in proportion as it is produced weaker or stronger, tends to prove that the presence of oxide of carbon augments the illuminating power of gas, no doubt augmenting at the same time the quantity of heat developed during combustion.

I shall not, therefore, be accused of exaggeration when I state, that there is some value in a process, the principle of which is to decompose water, a substance of no value, by means of coke, which is of very little value,—as under this process 1 lb. of oil, which costs a halfpenny, will supply a burner giving a light equal to ten candles, during twenty hours.

Scientific Adjudication.

JUDICIAL COMMITTEE OF THE PRIVY COUNCIL.

April 6th.

Present—THE LORD PRESIDENT, VICE-CHANCELLOR WIGRAM, *the* JUDGE *of the* ADMIRALTY COURT, *the* CHANCELLOR *of the* DUCHY *of* CORNWALL.

LOWE'S EXTENSION.

Mr. WEBSTER appeared in support of the petition, which was for an extension of the term of a patent "for increasing the illuminating power of coal-gas," by passing it through naphtha. The mode stated in the specification as the most simple was, charging the gas-meter with this spirit in place of water; but the insurance offices objected to having a large bulk of naphtha in one vessel,—and to meet this the patentee introduced the mode of saturating the gas in a separate vessel with the vapour of naphtha, by causing it to pass through a series of sponges charged with this volatile substance, which was found completely to effect the object, and to be unattended with either trouble or expense to the consumer; but, although the light thus produced was admitted to be superior to any other, the inventor had been unable to bring it into general use, and hitherto had received no return from it whatever.

Sir J. Clark, Physician to the Queen, said, he had used the naphthalized gas in his house for some years. It gives a clearer and more powerful light than coal-gas, with less heat. It produces fewer deleterious substances, and is, therefore, less injurious to health; also exhibits colours more clearly. At the fancy ball at Buckingham Palace, in 1842, a burner with this light was placed over the throne in the drawing-room, aud was much admired.

Mr. B. Hawes, director of the Chartered Gas Company and chairman of the Thames Tunnel Company, had used the naphthalized gas in his house and thought it a great improvement. It gives a stronger and clearer light at less cost; endeavoured to get the company to introduce it into general use; was met by the argument that the consumption of gas would fall off. His answer was, "Give the public a good article cheap, and consumption will increase, and make up for the diminution of price." Introduced it into the Thames Tunnel, but had been paid nothing for it; the Tunnel is very poor. So far as he knew the inventor had not received a shilling for the use of the light. He had had great difficulty in introducing it, and said to every one, "Only make a trial of it, and I will charge you nothing."

Dr. Reid said, he considered the naphthalized gas an important invention; it produced from 30 to 50 per cent. more light than common gas, with less heat. The effect is greatly increased by causing the gas to pass over warm naphtha, when it becomes more luminous according to the amount of oil absorbed.

Mr. A. Smee, F.R.S., had used the naphthalized gas. With the same quantity of light there is less heat, with a saving of 20 per cent. in gas. It is also more favorable to the human countenance, and to the distinguishing of colours.

The Attorney-General said, he did not feel it to be his duty to offer any opposition, and Dr. Lushington announced, that their Lordships would advise Her Majesty to prolong the patent for the term of five years.

IN THE JUDICIAL COMMITTEE OF THE PRIVY COUNCIL.

June 15th, 1846.

Before LORD BROUGHAM, LORD LANGDALE, M.R., DR. LUSHINGTON, *and* THE RIGHT HONORABLE PEMBERTON LEIGH.

WHYTOCK'S EXTENSION.

THE petition of Mr. Richard Whytock, of Edinburgh, for the prolongation of his patents for England, Ireland, and Scotland, granted to him for an invention of improvements in the production of figures in carpets, &c., having been referred by Her Majesty to the Judicial Committee on this day—

The Solicitor-General and Mr. Webster appeared for the petitioner; and Mr. Russell Gurney, Q. C., and Mr. Hindmarch appeared for Mr. Sievier, who had lodged a caveat against the prolongation.

The invention was entituled "An improved method or manufacture which facilitates the production of regular figures or patterns on different fabrics, particularly velvet, velvet pile, and Brussels, Wilton, and Turkey carpets;" and the object of it was to dispense with the complicated Jacquard machinery attached to Brussels and other carpet-looms, by printing or coloring the warp-threads in such a way as to produce any intended pattern when woven into the fabric of a Brussels, Wilton, or Axminster carpet.

Warps had been printed so as to produce patterns in woven fabrics prior to the petitioner's patent; but, according to the previous inventions, it was necessary to use the ordinary printing blocks; and as a manufacturer requires a block for each color in a pattern, and a separate set of blocks for every pattern, the great cost of the blocks had the effect of preventing the general adoption of the printing of warps for the purpose of producing patterns.

According to the petitioner's invention, however, blocks are dispensed with, by a very simple contrivance. Each thread is wound spirally round a drum, the circumference of which is exactly equal to the length of warp-thread required to form the intended pattern, and, of course, every revolution of the thread round the drum will require to be printed or colored in precisely the same way.

Brussels, Wilton, and Axminster carpets, it is well known, have their faces formed of loops, usually called 'terries', raised by wires, or by Mr. Sievier's ingenious carpet-loom. The length of woollen warp-thread required to form a terry, will, of course, vary according to the extent the terry is raised above the linen threads which form the foundation of the fabric; but in the ordinary Brussels carpets, the length of warp required is about half an inch.

Mr. Whytock divides the circumference of a wheel, at the end of his drum, into as many teeth or notches as there are to be terries in the intended pattern. The color is put upon the threads by a piece of wood, applied to them in a position parallel to the axis of the drum, and, consequently, it comes in contact with every revolution of the thread round the circumference of the drum. The piece of wood, which is used for this purpose, resembles a rule or straight-edge, having its edge of a thickness equal to the length of thread required for a terry. The piece of wood then having applied to its edges the color which is intended to be put upon the first terry which is to be colored, the colored edge is presented to the drum, and, being kept by guides in its proper position, is pressed upon the threads; and the particular terry in the first figure of the pattern, and every repetition of it, is thus colored in the way required. The piece of wood being then removed, the drum is turned round the distance of one or more notches of the wheel already mentioned, so that the second terry, which is to be colored, may be printed in like manner as the first, and then the third, and so on, until a complete revolution of the drum has been made. Every thread of a warp is printed in this manner, according to the pattern intended; and after the printed colors have been fixed by steaming, or other usual means, the threads are placed in the loom, and woven in the ordinary way, except that the Jacquard is dispensed with. By this mode of making Brussels carpets, a considerable saving is effected, not only in the materials employed in the manufacture, but also in the amount of labour required.

Several witnesses were called by the petitioner's counsel, who proved in substance the facts which have been stated.

The counsel for Mr. Sievier, the opposing party, did not call any witnesses, but opposed the prolongation on the ground that the patentee had been sufficiently remunerated, that the Irish patent was void, being dated several months after the inrolment of the English specification (for which Brown *v.* Annandale, 1 Webs. R. 433, and Samuda's case, Hindm. on Pat. 534, were cited), and that the petitioner refused to grant the opposing party a license, although he was ready to take it upon the same terms as licenses had been granted to others.

Their lordships were of opinion that the patentee had not been sufficiently remunerated, and although they intimated a strong opinion upon the question raised, respecting the validity of the Irish patent, the opposition being afterwards withdrawn, their lordships did not decide the point.

With reference, however, to the refusal to grant a license to Mr. Sievier, their lordships intimated that they would consider whether they would grant an extension unless the petitioner granted the license.

The Solicitor-General then proposed to grant a license to Mr. Sievier, if Mr. Sievier would grant the petitioner a license to use his invention of a carpet-loom, the sole use of which had been recently granted to him by patent.

Mr. Gurney objected to this, on the ground that Mr. Sievier's invention being most valuable, the grant of a license to the petitioner to use that invention would, in fact, be giving him much more than he received from any other person for a license to use his invention.

Their lordships were of opinion, that as Mr. Sievier had already obtained his patent, he could not be put under any terms as to the manner in which he was to exercise his invention; but that the petitioner coming before the Committee for a prolongation which he could only obtain as a matter of grant and favor, might be put under such terms as their lordships should think fit.

The petitioner then submitted to grant Mr. Sievier a license, upon which the opposition was withdrawn, and—

Lord BROUGHAM delivered the judgment of their lordships, to the effect that they would report in favor of a prolongation of each of the patents for the term of five years.

VICE-CHANCELLOR'S COURT.

Before SIR LANCELOT SHADWELL, *the Vice-Chancellor of England.*
June 4th, 1846.

WOODIN *v.* FIELD.

Mr. Bethell and Mr. Beavan moved to dissolve an *ex parte* injunction, granted on the 27th of April, to restrain the defendant, who is the well-known veterinary surgeon, from infringing a patent obtained by the plaintiff on the 27th March, 1845, for an improvement in making horse-shoes*, which consists in forming certain projections and indentations on the outer ridge of the upper surface of the shoe, in such a manner as to form stops or catches to prevent horses from sliding upon wooden pavements. In support of the motion, it was contended that the invention was not new, that the same method of roughing shoes had been used for very many years, and that a patent, corresponding to that obtained by the plaintiff, was taken out by a person named Blundevill, who had written a book upon the subject of horsemanship, in the year 1609, wherein he had exactly described a shoe such as the plaintiff claimed for his invention.

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* For description of this Invention, see Vol. 27, p. 248, of the London Journal.

Mr. J. Parker appeared in support of the injunction.

The Vice-Chancellor said, when the case came before him, upon the application for an injunction, he remembered entertaining forebodings in his mind that the plaintiff's case would not long remain undisturbed. He thought there was nothing in the principle of the plaintiff's invention, as expressed upon his specification, which differed from the description of shoes in Blundevill's book. The object described by both was this: instead of having a uniform surface to the shoe, to make it in such a manner as to form an uneven surface, so as to prevent the horse from sliding,—this was, in fact, precisely similar to the cloven foot of some beasts which had the same effect in preventing them from slipping. His Honour admitted there might be an alteration in the plaintiff's method of forming the surface, but it was the same principle. He should, therefore, dissolve the injunction, with costs, but give the plaintiff leave to bring such action as he might be advised.

REPORT OF AMERICAN PATENTS.

BY MR. C. M. KELLER.

From the "Journal of the Franklin Institute."

To THOMAS F. GRIFFITH, *Newmarket, Dorchester county, Md., for an improvement in the method of building vessels with moveable keels.*

THE permanent keel projects but very little from the bottom of the vessel, and to this is fitted the moveable keel in such a manner that it can be connected, or disconnected, at pleasure. Chains are attached to the upper surface of the moveable keel, which pass up to the deck through vertical tubes, and other chains attached to the side of the keel, extend around the outside of the vessel. When it is desired to put on the moveable keel, the outside chains are liberated, and the inner ones drawn up, which brings the keel to the proper position, and it is there secured by means of vertical bolts, which pass through the permanent, and enter the moveable, keel. When these are all liberated, the keel can be drawn up to the side of the vessel above the water line.

Claim:—"Having thus fully described the nature of my improvement in building vessels, and shewn the manner in which the same is carried into operation, what I claim therein as new, and desire to secure by letters patent, is the manner of attaching a moveable to a stationary keel, and of shipping and unshipping the same, by means of bolts and chains, substantially as herein set forth."

To JOHN COCHRANE, *of Baltimore, Md., for an improvement in the drop cut-off valves of steam-engines.*

THIS is for a modification of the checking apparatus, or what is known as the dasher and pot of the Sickles' cut-off valves, and consists in working the dasher attached to the stem of the valve within a steam dash pot, open at top for the free passage of steam, and having an aperture at the bottom governed by a valve to regulate the escape of steam, and consequently, the descent of the valve on its seat.

Claim:—"What I claim as my invention in this machine and desire to secure by letters patent, is the manner of using the dasher or piston that is attached to the stem of the steam valve in combination with and working within a short cylindrical vessel, or check chamber, which is open at top, to allow a free passage to the steam in and out, and is furnished with an adjusting slide to regulate the escape of the steam; by which means the valve is made to take its seat without striking or noise."

To JOHN COCHRANE, *of Baltimore, Md., for improvements in the auxiliary steam-engine for supplying steam-boilers with water.*

THE patentee says, "The intention of an auxiliary supply engine is not only to supply water to a boiler, but to preserve the same at a uniform height therein, without its being affected by any irregularity in the consumption or evaporation of that fluid; said auxiliary engine stopping and starting and working quickly, or slowly, as the demands of the boiler may require. Under the arrangement that I prefer, the admission of steam to the auxiliary engine is governed by a float and balanced valves, placed in a chamber outside the boiler, but communicating therewith by two branches, one above and the other below the water line; so that the water may have the same level both in the chamber and boiler. The float is furnished with a tubular stem at bottom, opening into it, for the purpose of carrying off any leakage; this stem passes out through a stuffing-box in the lower part of the chamber, the arrangement of this part being substantially the same with that represented and described in the specification and drawings accompanying letters patent of the United States granted to me on the 13th day of July, 1844, for regulating the supply of water in steam boilers. The float, however, may be otherwise arranged and modified, the only requisite being that its action on the steam valve should be governed by the height of water in the boiler.

"It is not pretended that an auxiliary engine for the supplying of water to steam boilers is in itself new, such engines having been heretofore employed for that purpose; but I have, as I believe, succeeded in so constructing and arranging the parts of such an engine as to obviate the main difficulties heretofore encountered in the attempts to employ them.

Claim :—"Having thus fully described the nature of my improvements in the auxiliary supply engine, what I claim therein as new and desire to secure by letters patent, is first, the manner herein described of completing the stroke, or traversing motion, of the valve, by the commencing return stroke of the piston operating on the spring arms, substantially in the manner and for the purpose herein set forth.

"I likewise claim the manner of regulating the stroke of the water pump, by adjusting the same by means of a valve, or cock, as set forth, so that a smaller and regulated quantity of steam shall be admitted to the lifting, than is admitted to the forcing, side of the piston as described."

To GEORGE W. THAYER, *of Springfield, Hampden county, Mass., for an improvement in the truss frames of bridges, &c.*

DIAGONAL braces extend from the lower end of one post to the upper end of the next, and abutting against shoulders on the posts, and these braces are crossed by other braces pinned to the posts. And for the purpose of cambering the trusses, screw rods extend from post to post, above and below the junction of the posts and diagonal braces.

Claim:—"Having thus set forth my invention, I claim the combination of one or more series of iron screw rods with the suspension posts and chords, or string pieces, of a truss, in the manner and so as to operate substantially as herein above specified.

"I do not claim the combining with the posts, braces and strings of a truss, but what I do claim is the arrangement of such a series of braces upon the *outer sides of the truss*, and so that they shall extend above and below the chords thereof, and be confined to the truss, substantially as above described."

To GERSHOM L. ACKERMAN, *of Troy, Rensselaer county, N. Y., for an improvement in the method of constructing the wheels of carriages, waggons, &c.*

THE object of this improvement is to insert the tenons of two spokes in one mortise, so that they shall brace each other, instead of having a mortise for each separate spoke.

Claim :—"What I claim and desire to secure by letters patent, is the construction and use of wheels with two spokes in one mortise, in the manner and for the purpose above described."

To DANIEL GOSS, assignee of Joseph C. Colt, *of Catskill, N. Y., for an improved method of adjusting the follower of presses.*

THE patentee says,—"The nature of my invention consists in attaching one or more hydraulic cylinders to the platen or follower of the press, and providing them with valves, so as to allow the plungers to work out and in the cylinder, according to the pressure on the platen; the valve to be operated upon by the movement of the press, so that the platen will resist an increasing force as the power of the press increases more or less."

Claim:—"Having thus fully described my application of the self-adjusting platen and shewn its operation, what I claim therein as new and desire to secure by letters patent, is the *application* of the hydraulic cylinder to the platen of the toggle joint and other progress in power presses, whether it be by applying the cylinder direct to the platen, or through the medium of screws, or wedges, racks and pinions, or other analogous devices, so that through the medium of the spring and gearing attached to the press, an increasing weight is thrown upon the valve, so as to produce the desired effect upon the platen, the whole being combined and operating in the manner herein set forth."

To WM. T. CLOUGH, *of Jersey City, N. J., for a process for manufacturing an oil from the residual tarry liquid of rosin gas works.*

THIS oil is a compound of carbon and hydrogen, which is procured by the dry distillation of rosin, or from the residual tarry liquid of the rosin gas works.

Claim:—"I do not claim the particular form or description of apparatus, still, or retort. What I claim is the process, or mode of producing the American oil, as set forth in the above specification and drawings.

"Such apparatus may be modified or varied; as circumstances may require from time to time, as may be deemed expedient.

"What I claim is the process as herein above set forth, of producing the substance which I denominate the American oil, such process being conducted substantially in the manner described."

To C. HEARIVAL, *of Baton Rouge, La., for a machine for skimming liquids.*

THE patentee says—"The nature of my invention consists in introducing into the liquid to be skimmed, a vessel having a flanch extending out horizontally on one side, with a rim standing up on its outer edge, as hereafter more particularly described; the said vessel, by being revolved, skims the liquid, and receives the skimmings into the centre of the vessel.

Claim:—"Having thus fully described my machine and its operation, what I claim as my invention and desire to secure by letters patent is the apparatus for skimming a liquid, by means of a vessel in which the scum is collected, by the revolution of the flanch, or sweep, forming a kind of spoon, acting down below, but very near the level of the scum, as set forth."

To JAMES DANE, *of West Derby, Orleans county, Vt., for an improvement in saw mills.*

THE carriage of the saw mill is to be provided with two longitudinal rails along the middle, with a sufficient space between them for the passage of the saw; and transverse rest bars, to support the log, extend from these to the side rails of the carriage, so that by this means, the log and the board that is being sawed are supported from end to end.

Claim:—"Having thus concluded my description, I shall claim the employment and use of the longitudinal centre rail pieces and transverse rest bars, as combined with or applied to the rectangular carriage, and for the purposes as above described."

To ALEXANDER BOYD, *of Providence, R.I., for a self-acting feeder for printing fabrics.*

THE patentee says,—"The peculiar object of my self-acting feeder, which is to be used in block printing of calicoes, mousselines de laine and various other fabrics, is to supply the sieve cloth, from which the blocks receive their color, or colors, with the requisite quantity of printing material, whether the same be of one or of several different colors, or of several shades of one color; and my mechanism is intended to supersede that which is generally employed, and which requires great nicety in its construction and use, but is very liable to accidental mixture of the several colors, and consequent loss of the same to the printer.

Claim:—Having thus described my invention, I shall claim a feeder constructed of one or more troughs or apartments, and with the discharging orifices and adjustable valves adapted to them, the whole being for the purpose as hereinbefore set forth."

LIST OF REGISTRATIONS EFFECTED UNDER THE ACT FOR PROTECTING NEW AND ORIGINAL DESIGNS FOR ARTICLES OF UTILITY.

1846.

May 27. *William Swain*, of Pembridge, in the county of Hereford, brickmaker, for a hand-machine for making draining and other tiles, pipes, &c., with all kinds of clay, even the most unfavorable.

27. *Francis Bassano*, of Birmingham, for a railway roof lamp.

28. *Richard Robinson*, of Lisburn, agricultural implement maker, for the Lisburn potatoe washing machine.

May 28. ***James Parkes & Son***, of Birmingham, for a stock fastener.

28. *William Hopkins*, of Birmingham, for a substitute for rack pulleys for blinds.

29. *Josiah Carter*, of 65, Blackman-street, Borough, for a lock spindle.

June 2. *John & Charles Ratcliff*, of 140, Suffolk-street, Birmingham, for apparatus for raising and lowering chandeliers.

2. *John & Charles Ratcliff*, of 140, Suffolk-street, Birmingham, for apparatus for raising and lowering chandeliers.

4. *Charles John Edwards*, of 6, Beech-street, Barbican, London, for an improved strap or band for driving machinery.

5. *John Greaves & Son*, of 56, South-street, Sheffield, for a chromatic tuning fork.

8. *Joseph Coward*, of No. 2, King-street, Snowhill, for a self-adjusting wrench.

8. *Thomas Wedlake*, of Bristol, for a reversing apparatus for hay-making machines.

10. *Soutter & Hammond*, of the Spread Eagle works, Limehouse, for a pneumatic tilt hammer and pile driver.

10. *Joseph Coward*, of No. 2, King-street, Snowhill, for a bed-screw wrench.

10. *Joseph Coward*, of No. 2, King-street, Snow-hill, for a screw wrench.

11. *John Affleck & Co.*, of Dumfries, iron-founders, for an improved drill and seed sowing machine.

12. *George Cox*, of Southwick-crescent, for the Stellar shot cartridge.

16. *James Walby*, of 59, Greek-street, Soho, London, for a fire-escape.

17. *George Earl*, of the Peckham School of Design, for the Coniometricon.

17. *Henry Smith & Thomas Woodhouse Ashby*, of Stamford, agricultural implement makers, for a hay-making machine.

17. *Charles Sparrow*, of 11, New North-street, Red Lion-square, London, for a safety-catch, applicable to bracelets, lockets, rings, &c.

June 19. *John Major Aldridge*, of 20, Nelson-street, City-road, for a double-action door spring.

19. *Guy & Brown*, of 18, Brecknock-place, Camden-town, for a window shutter.

List of Patents

That have passed the Great Seal of IRELAND, from the 16th May to 22nd June, both inclusive.

To Richard Archibald Brooman, of 166, Fleet-street, in the city of London, Gent., for certain improvements in dyeing,—being a communication.—Sealed 25th May.

James Allingham, of Dublin, in the kingdom of Ireland, Gent., and the Reverend James William M'Gawley, of the city of Dublin aforesaid, for certain improvements in steam-engines.—Sealed 29th May.

John Davie Morries Stirling, of Blackgrane, in North Britain, Esq., for certain new alloys and metallic compounds, with a method of welding the same and other metals.—Sealed 1st June.

Robert Brett Schenck, of the city of New York, Gent., for certain improvements in the preparation of hemp and flax.—Sealed 4th June.

William Ashby, of Croydon, in the county of Surrey, millwright, for certain improvements in the manufacture of flour.—Sealed 12th June.

Elijah Galloway, of 14, Buckingham-street, Strand, in the county of Middlesex, civil engineer, for improvements in locomotive engines.—Sealed 13th June.

Richard Boyse Osborne, of Limerick, civil engineer, for certain improvements in bridges, roofing, and flooring,—being a communication.—Sealed 22nd June.

List of Patents

Granted for SCOTLAND, subsequent to May 22nd, 1846.

To George Hinton Bovill, of Millwall, London, engineer, for improvements in manufacturing wheat and other grain into meal and flour,—being a foreign communication.—Sealed 25th May.

William Longshaw, of Manchester, cotton spinner, for certain improvements in machinery or apparatus for spinning and doubling cotton and other fibrous substances.—Sealed 27th May.

George Duncan, of Edinburgh, engineer, for an improved method of making comfits, confectionery, lozenges, and all descriptions of pan goods; the machinery and apparatus for the manufacture of the same, or for any other article to which the said apparatus or machinery may be made applicable.—Sealed 28th May.

George Lowe, formerly of Brick-lane, Old-street, London, but now of Finsbury-circus, civil engineer, *for an extension for five years*, for increasing the illuminating power of such coal-gas as is usually produced in gas-works; also for converting the refuse products from the manufacture of coal-gas into an article of commerce not heretofore produced therefrom; and also of a new mode of conducting the process of condensation in the manufacture of gas for illumination.—Sealed 2nd June.

John Webster Hale, of Fitzroy-square, London, for improvements in machinery for cleaning or freeing wool and certain other fibrous materials of burrs and other extraneous substances,—being a foreign communication.—Sealed 4th June.

Nathan Defries, of St. Martin's-lane, London, engineer, for improvements in gas-meters.—Sealed 4th June.

Stephen R. Parkhurst, of Liverpool, machinist, for an improved method of propelling vessels.—Sealed 4th June.

Moses Poole, of the Bill Office, London, Gent., for improvements in making fabrics from fibrous materials,—being a foreign communication.—Sealed 4th June.

John Webster Cochran, of Paris, engineer, for certain improvements in machinery for cutting and shaping wood for shipbuilding and other purposes.—Sealed 12th June.

John Forrester, of Paisley, shawl manufacturer, for certain improvements in machinery for fulling cloth manufactured of wool, cotton, silk, and other fibrous substances.—Sealed 16th June.

Bennet Woodcroft, of Manchester, consulting engineer, for an improved mode of printing certain colors on calico and other fabrics.—Sealed 18th June.

Robert Reyburn, of Brown-street, Glasgow, chemist, for improvements in making extracts from animal and vegetable substances.—Sealed 18th June.

William Spily, of Carrington, county of Nottingham, engineer, for improvements in the construction of furnaces used for heating water and other fluids.—Sealed 18th June.

François Stanislaus Meldon de Sussex, of Millwall, London, manufacturing chemist, for improvements in the manufacture of soda water.—Sealed 18th June.

Thomas Jones, of Salford, machine-maker, for certain improvements in machinery or apparatus for preparing, slubbing, and roving cotton, wool, and other fibrous material.—Sealed 22nd June.

New Patents

SEALED IN ENGLAND.

1846.

To Nathan Defries, of St. Martin's-lane, engineer, for improvements in gas-meters. Sealed 27th May—6 months for inrolment.

John Hyde, of Manchester, engineer, for certain improvements in looms and apparatus connected with looms for weaving. Sealed 27th May—6 months for inrolment.

Charles Heard de Boissimon, of Leicester-place, Middlesex, merchant, for improvements in manufacturing corks and bungs,—being a communication. Sealed 28th May—6 months for inrolment.

John Aston, of Birmingham, button manufacturer, for improvements in buttons and in ornaments for dress. Sealed 28th May—6 months for inrolment.

Alexander Southwood Stocker, of Camden-road Villas, Middlesex, Gent., for improvements in the manufacture of bottles and other similar vessels; also in stopping or covering the same, and in the manufacture and application of the whole or part of the articles to be used. Sealed 28th May—6 months for inrolment.

John Blyth, of St. Ann's, Limehouse, engineer, for an improved mode of closing the orifices of bottles or other vessels applicable to ink-holders. Sealed 28th May—6 months for inrolment.

Richard Marvin, of Portsea, Southampton, Gent., and William Henry Moore, of Southsea, in the same county, Gent., for improvements in gratings of metal or wood for the fronts of houses and general purposes, for the admission of light and ventilation. Sealed 28th May—6 months for inrolment.

Henry Seymour Westmacott, of No. 28, John-street, Bedford-row, Gent., for an improvement in the construction of rotatory steam-engines,—being a communication. Sealed 30th May—6 months for inrolment.

Henry Lawrence Tobias Tschudy Von Uster, of the College for Civil Engineers, Putney, for improvements in apparatus or machinery for measuring and indicating the distance travelled by wheel carriages. Sealed 2nd June—6 months for inrolment.

Moses Poole, of the Bill Office, Gent., for improvements in making fabrics from fibrous materials. Sealed 2nd June—6 months for inrolment.

William Stubbs and John Isaiah Grylls, both of Llanelly, South Wales, engineers, for improvements in locomotive and other engines and carriages. Sealed 2nd June—6 months for inrolment.

John Webster Cochran, of Paris, engineer, for certain improvements in machinery for cutting and shaping wood for ship building and other purposes. Sealed 2nd June—6 months for inrolment.

William Carter Stafford Percy, of Manchester, upholder, for certain improvements in the manufacture of bricks, tiles, chimney tops, and other similar articles. Sealed 2nd June—6 months for inrolment.

Joseph Clinton Robertson, of 166, Fleet-street, London, civil engineer, for certain improvements in railways and railway carriages. Sealed 4th June—6 months for inrolment.

George Lowe, formerly of Brick-lane, Old-street, Middlesex, but now of Finsbury-circus, in the said county, civil engineer, for an extension of a patent granted to him for his invention, for increasing the illuminating power of such coal-gas as is usually produced in gas-works ; also for converting the refuse products from the manufacture of coal-gas into an article of commerce not heretofore produced therefrom ; and also of a new mode of conducting the process of condensation in the manufacture of gas for illumination, for the term of five years from the 9th day of June, 1846. Sealed 4th June.

John Taylor, of Carlisle, in the county of Cumberland, miller, for certain improvements in flour mills and in machinery connected therewith. Sealed 6th June—6 months for inrolment.

Robert Rettie, of Glasgow, civil engineer, for certain improvements in the manufacture of fuel, parts of which improvements are applicable for the purposes of purifying, compressing, or extracting vegetable and other substances and fluids, and in the machinery or apparatus to be used for the same. Sealed 12th June—6 months for inrolment.

Edward Cottam, of St. John's Wood, for improvements in bedsteads. Sealed 16th June—6 months for inrolment.

Frederick Handell Burkinyoung, of Baker-street, Middlesex, Gent., for improvements in piano-fortes. Sealed 16th June—6 months for inrolment.

Benjamin Fothergill, of Manchester, machine-maker, and Richard Johnson, of Clitheroe, in the same county, cotton spinner, for improvements in certain parts of machinery used in the preparation for spinning, and in the spinning and doubling of cotton wool and other fibrous substances. Sealed 16th June—6 months for inrolment.

Robert Reyburn, of Brown-street, Glasgow, chemist, for improvements in making extracts from animal and vegetable substances. Sealed 17th June—6 months for inrolment.

William Cormack, of Thames-street, Greenwich, chemist, for improvements in obtaining motive power. Sealed 17th June—6 months for inrolment.

Alfred Richard Johnson, of the firms of Messrs. Johnson and Co., of Regent-street, and Messrs. Griffiths and Johnson, Old Bond-street, hatters, for certain improvements in hats, caps, and bonnets. Sealed 18th June—6 months for inrolment.

John Simson, of Riches-court, Lime-street, city, merchant, for certain improvements in machinery for preparing and spinning flax and other fibrous materials. Sealed 20th June—6 months for inrolment.

Henry Austin, and Thomas Webster Rammell, of No. 10, Walbrook, city, civil engineers, for improvements in wood, mosaic, and tessellated work. Sealed 22nd June—6 months for inrolment.

Spencer Thomas Garrett, of Cliff Bank Lodge, Stoke-upon-Trent, in the county of Stafford, Esq., for certain improvements in cements, bricks, tiles, quarries, slabs, and artificial stones. Sealed 22nd June—6 months for inrolment.

Bennett Woodcroft, of Manchester, consulting engineer, for an improved mode of printing certain colours on calico and other fabrics. Sealed 22nd June—6 months for inrolment.

Thomas Walker, of Birmingham, stove-maker, for improvements in ships' logs, and in sounding machines. Sealed 22nd June —6 months for inrolment.

John Mercer, of Oakenshaw, in the county of Lancaster, chemist, and John Greenwood, of Church, in the same county, chemist, for certain improvements in dyeing and printing Turkey-red and other colours. Sealed 22nd June—6 months for inrolment.

William Mathers Hall, of Leeds, brass-founder, for a certain improvement or certain improvements in and applicable to sliding gas pendants, lamps, lustres, and chandeliers. Sealed 22nd June—6 months for inrolment.

Joseph Renshaw, of Salford, in the county of Lancaster, mechanic, for certain improvements in machinery or apparatus for finishing velvets, and other piled goods or fabrics. Sealed 22nd June—6 months for inrolment.

John Gillett, of Brailes, in the county of Warwick, agricultural implement maker, for an improved apparatus for protecting property by sounding alarums or giving signals. Sealed 22nd June—6 months for inrolment.

William Cotton, of Loughborough, in the county of Leicester, manufacturer, for certain improvements in knitting machinery. Sealed 22nd June—6 months for inrolment.

Joseph George, of Chelsea, Middlesex, coal and mine master, for improvements in the construction of houses, buildings, and other erections. Sealed 22nd June—6 months for inrolment.

Thomas Jones, of Salford, in the county of Lancaster, machine-maker, for certain improvements in machinery or apparatus for preparing, slubbing, and roving cotton wool and other fibrous materials. Sealed 22nd June—6 months for inrolment.

William Topling Nesham, of the London Docks, engineer, for certain improvements in the apparatus and mode of applying power for raising and lowering weights or heavy bodies. Sealed 22nd June—6 months for inrolment.

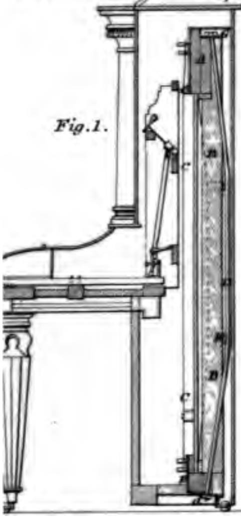
Ambrose Lord, of Allerton, in the county of Chester, toll collector, for certain improvements in furnaces and the flues of steam-boilers, for the purposes of consuming the smoke and economizing the fuel. Sealed 24th June—6 months for inrolment.

CELESTIAL PHENOMENA FOR JULY, 1846.

D.	H.	M.	
1			Clock before the ☉ 3m. 25s.
			☽ rises 0h. 1m. A.
			☽ passes mer. 5h. 47m. A.
			☽ sets 11h. 24m. A
	9	24	☽ in □ or first quarter
	18		☿ in conj. with Vesta diff. of dec. 0. 31. N.
2	—		Occul. α Virginis, im. 8h. 13m. em. 9h. 28m.
3	9	30	Pallas in □ with the ☉
5			Occul. γ Scorpii, im. 10h. 55m. em. 11h. 36m.
5			Clock before the sun, 4m. 10s.
	—		☽ rises 4h. 34m. A.
	—		☽ passes mer. 9h. 5m. A.
	—		☽ sets 0h. 51m. M.
	10		♂ greatest hel. lat. N.
6	5	49	♅ in □ with the ☉
	14	19	♀ in conj. with ♃ diff. of dec. 1. 22. S.
	22	56	Pallas in the descending node
7			Occul. 16 Sagittarii, im. 11h. 3m. em. 11h. 34m.
8	11	11	Ecliptic oppo. or ○ full moon.
8			Occul. *p*2 Sagittarii, im. 12h. 39m. em. 13h. 43m.
9	16		☽ in Perigee
9	20	25	☿ in conj. with ♂ diff. of dec. 0. 20. N.
10			Clock before the sun, 4m. 57s.
	—		☽ rises 8h. 54m. A.
	—		☽ passes mer. 1h. 5m. M.
	—		☽ sets 6h. 0m. M.
11	12	24	♄ in conj. with ☽ diff. of dec. 6. 21. S.
13	15	15	♃'s second sat. will im.
14	12	23	♅ in conj. with the ☽ diff. of dec. 2. 30. S.
15			Clock before the sun, 5m. 34s.
	—		☽ rises 11h. 14m. A.
	—		☽ passes mer. 5h. 34m. M.
	—		☽ sets 0h. 34m. A.
	1	24	☽ in □ or last quarter
	14	37	♃'s first sat. will im.
16			Mercury R. A. 9h. 20m. dec. 16. 26. N.
	—		Venus R. A. 5h. 1m. dec. 21. 1. N.
	—		Mars R. A. 8h. 58m. dec. 18. 24. N.
	—		Vesta R. A. 8h. 9m. dec 21. 50. N.
	—		Juno R. A. 14h. 25m. dec. 0. 54. S.
	—		Pallas R. A. 0h. 49m. dec. 4. 16. N.
	—		Ceres R. A. 3h. 18m. dec. 10. 41. N.
	—		Jupiter R. A. 4h. 23m. dec. 20. 51. N.
	—		Saturn R. A. 22h. 9m. dec. 13. 1. S.
	—		Georg. R. A. 0h. 53m. dec. 4. 59. N.
	—		Mercury passes mer. 1h. 44m.
	—		Venus passes mer. 21h. 26m.
	—		Mars passes mer. 1h. 22m.
	—		Jupiter passes mer. 20h. 45m.
	—		Saturn passes mer. 14h. 31m.
	—		Georg. passes mer. 17. 15.
18	12	58	♃ in conj. with the ☽ diff. of dec. 2. 6. N.
19			Occul. 119 Tauri, im. 14h. 12m. em. 14. 17m.
19	13	15	♀ in conj. with the ☽ diff. of dec. 2. 5. N.
	22	39	♅ stationary
20			Clock before the sun 6m. 0s.
	—		☽ rises 1h. 47m. M.
	—		☽ passes mer. 9h. 46m. M.
	—		☽ sets 5h. 44m. A.
21	15	21	☿ in the descending node
23	8	3	Ecliptic conj. or ● new moon
24	6		Pallas in conj. with ♅ diff. of dec. 1. 24. S.
	10	17	♂ in conj. with the ☽ diff. of dec. 6. 15. N.
	19		☽ in Apogee
25			Clock before the ☉ 6m. 11s.
	—		☽ rises 6h. 40m. M.
	—		☽ passes mer. 1h. 37m. A.
	—		☽ sets 8h. 24m. A.
	10	23	☿ in conj. with the ☽ diff. of dec. 4. 0. N.
28			Juno in Aphelion
	6	58	Vesta in conj. with the ☉
	13	46	☿ greatest elong. 27. 12. E.
	18	43	Juno in □ with the ☉
31	11	3	☽ in □ or first quarter
31	19		☿ in Aphelion

J. LEWTHWAITE, Rotherhithe.

Hattersley's imp.ts in piano-fortes.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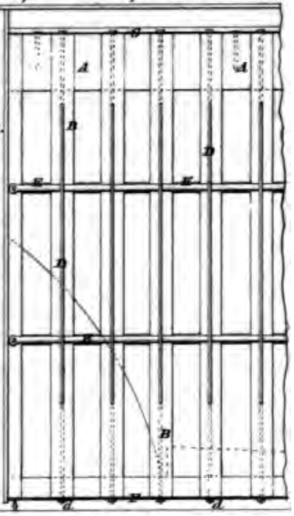
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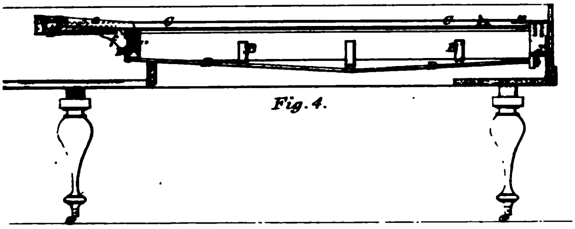
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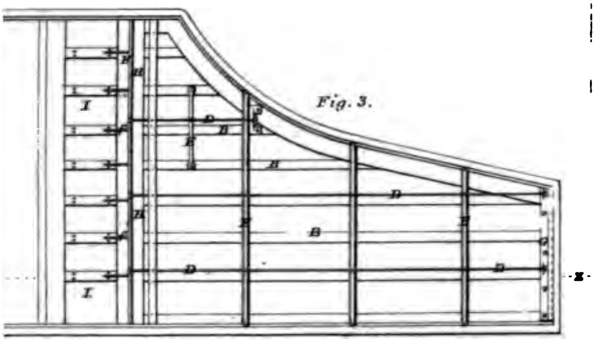
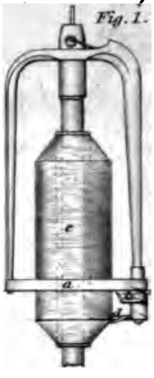


Fig. 3.

Fletcher's imp.ts in spinn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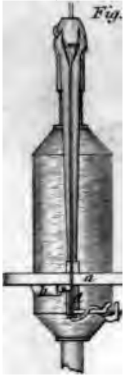
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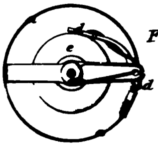
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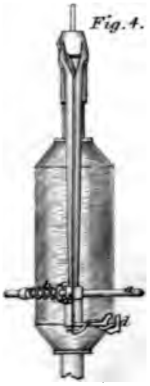
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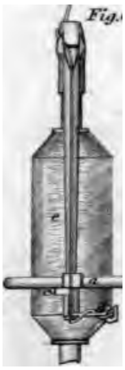
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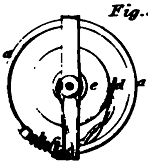
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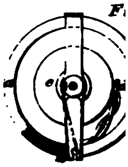
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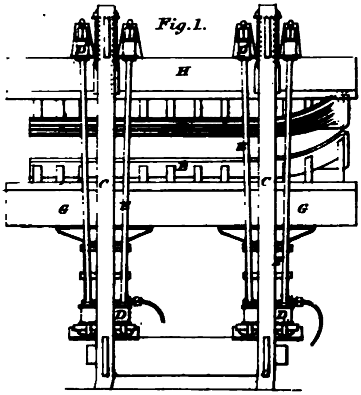
Detmold's app.ts fo stamping metall boats, &c.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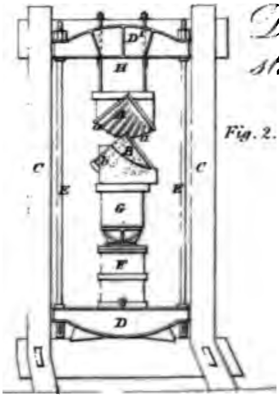
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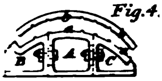
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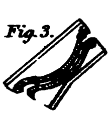
Fig. 3.

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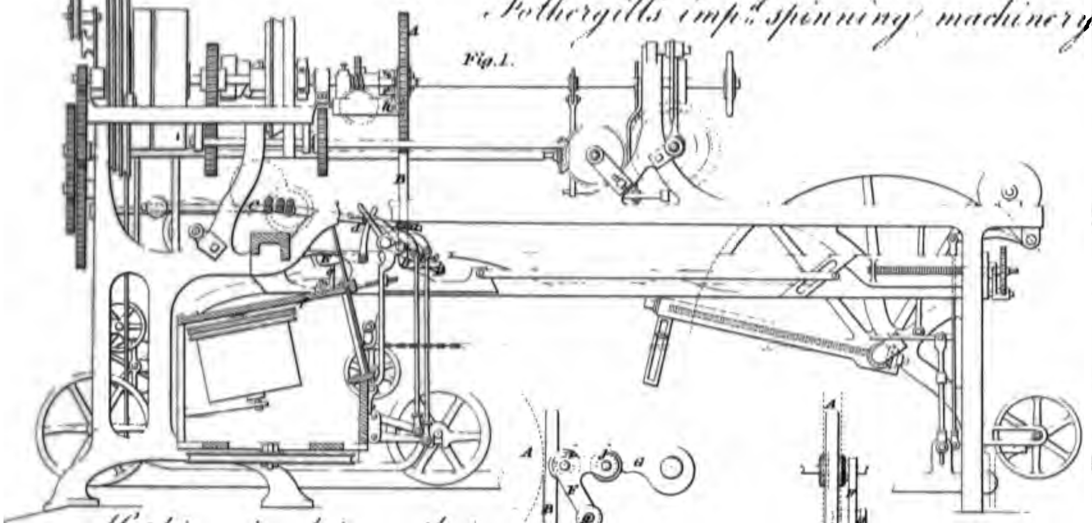
Fothergill's imp^d. spinning machinery.

Fig. 1.



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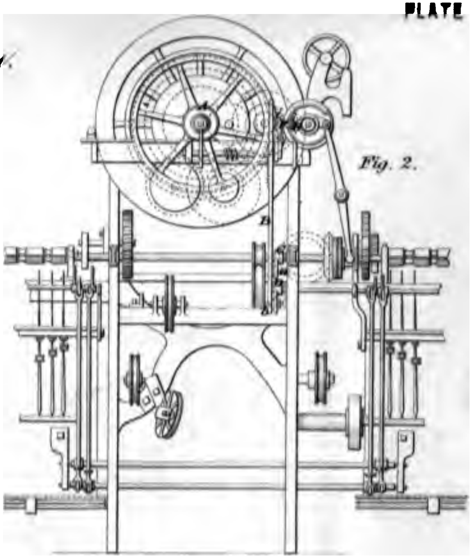

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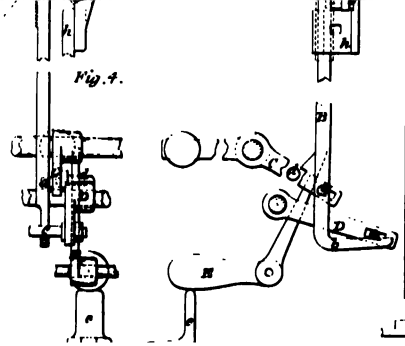


Hopkins' imp^s. in rails.

Fig. 1.

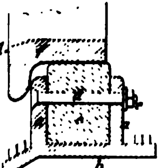


Fig. 2.

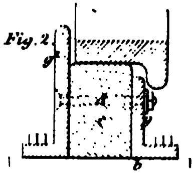


Fig. 3.

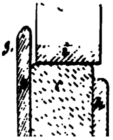
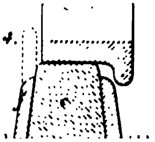


Fig. 4.



Shaw's rotary engine.

Fig. 2.

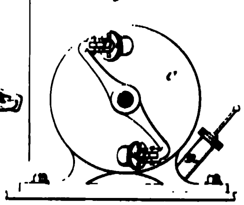
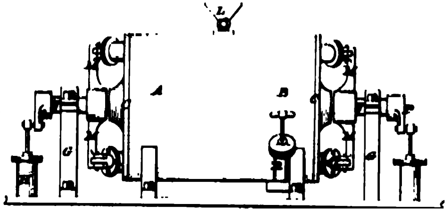
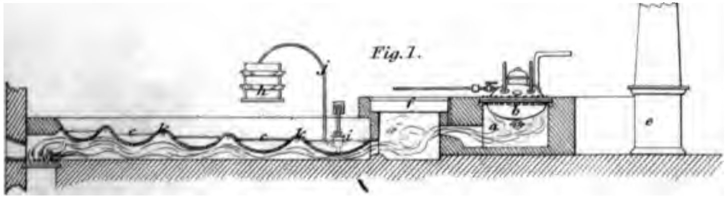


Fig. 1.



Pearse & Child's app.ts for manufac.g sugar.

Fig. 1.



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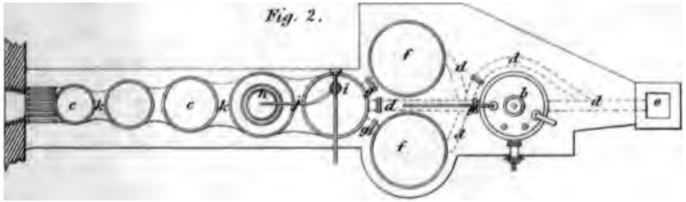


Hardy's imp.ts in making tubes.

Fig 3

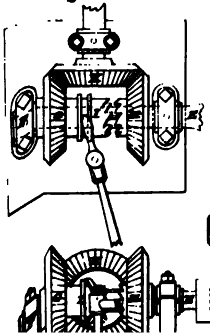


Fig. 1.

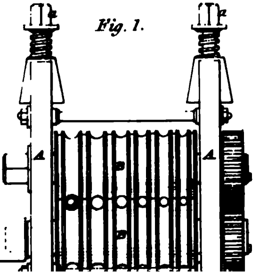
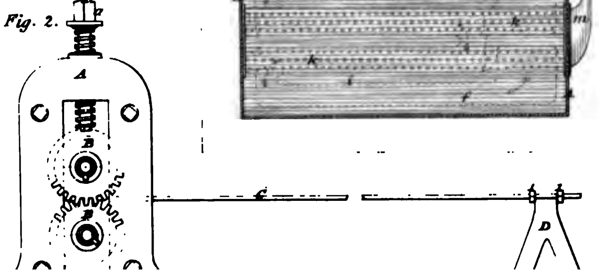
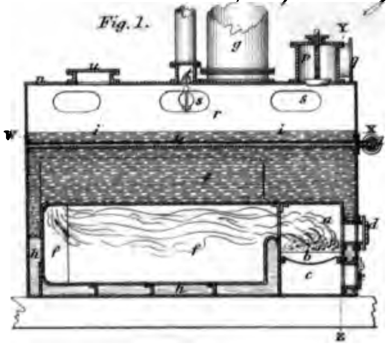


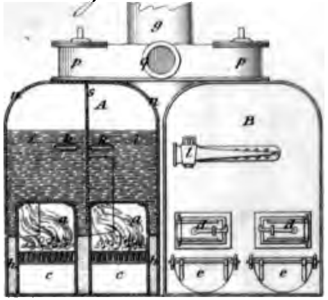
Fig. 2.

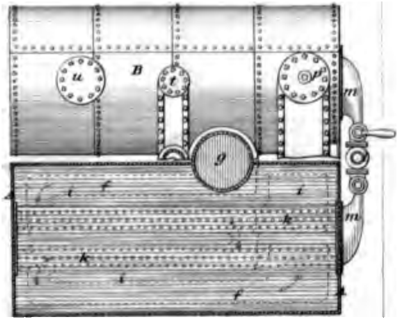


Lesnard's imp.ts in generating steam.

Fig. 1.







Crampton's imp.s in match boxes.

Fig. 2.

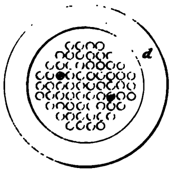
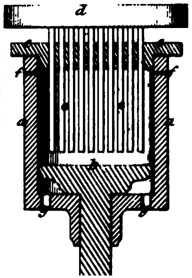


Fig. 1.



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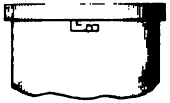
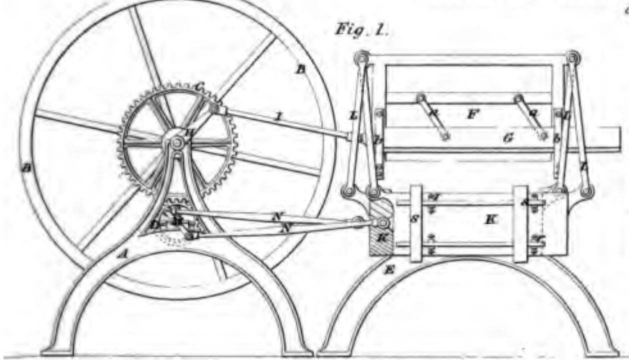


Firchild's cutting & grinding machine.

Fig. 1.



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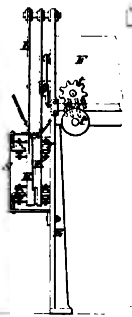

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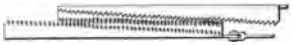

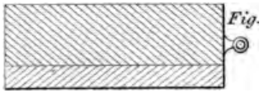

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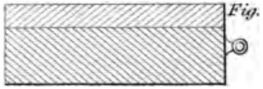

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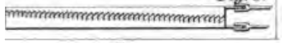
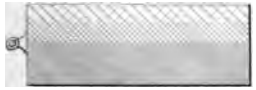


Fig. 8.

Fig. 3.



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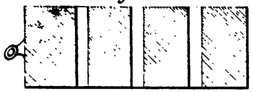

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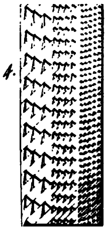

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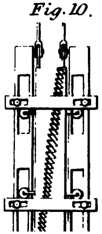
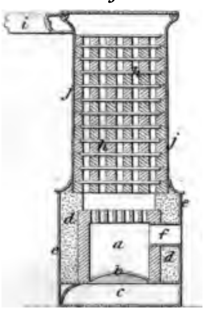


Searle's imp^ts in stoves.

Fig. 1.



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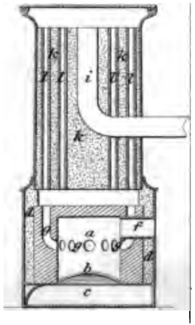

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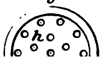


Lings app^ts for preserving food.

Fig. 3.

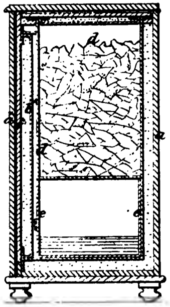
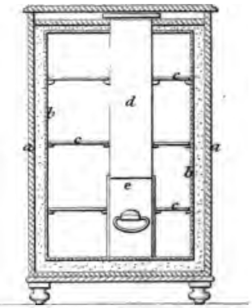


Fig. 1.



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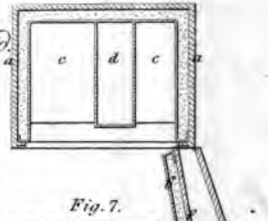

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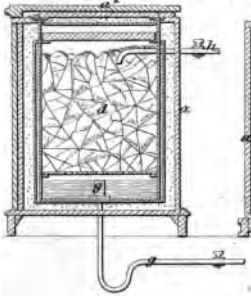

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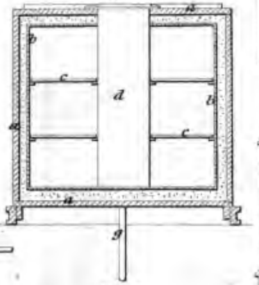

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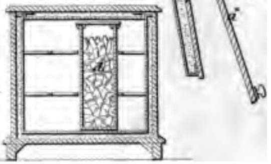

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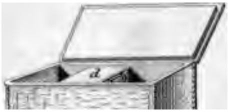

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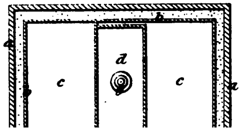
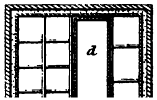
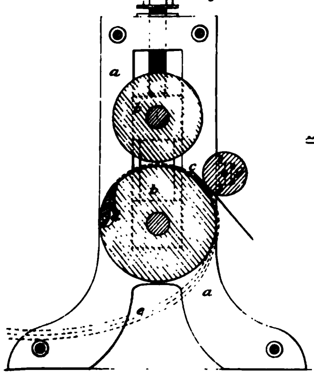


Fig. 8.



Sinclair's mach^y for glazing paper.

Fig. 1.



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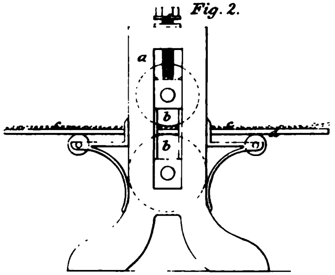


Fig. 3.

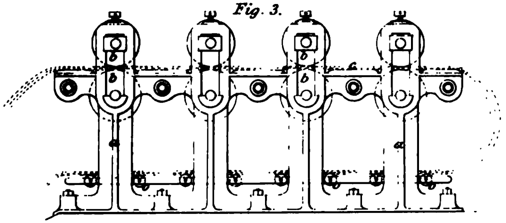


Fig. 4.

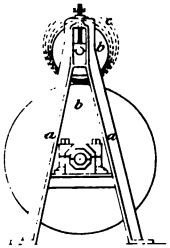


Fig. 6.

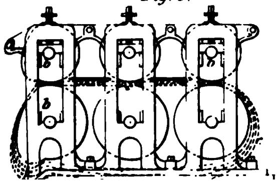
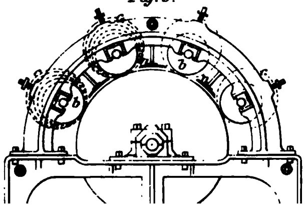
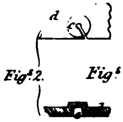


Fig. 5.



Wilson's spinning mach^y

Fig^s 2.



Fig^s 4.

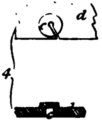
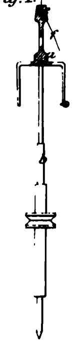


Fig. 1.



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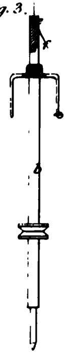


Brown's imp^d casks.

Fig. 2.

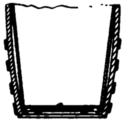
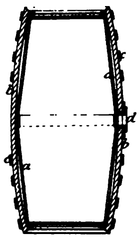
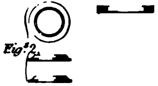


Fig. 1.



Goddard's imp^ts in making candles.

Fig^s 2.



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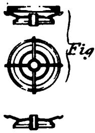

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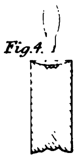

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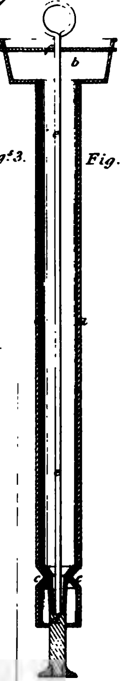
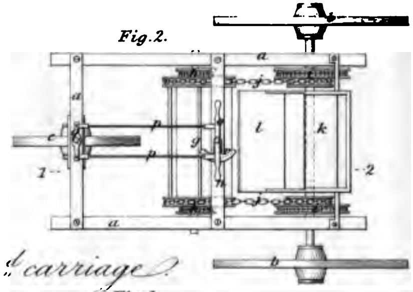


Metcalfe's imp^d carriage

Fig. 2.



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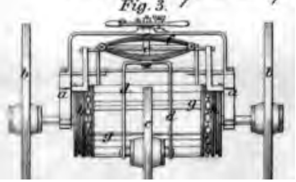

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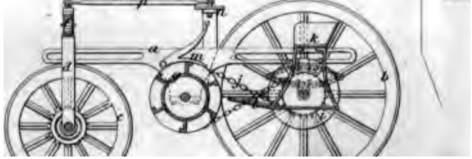
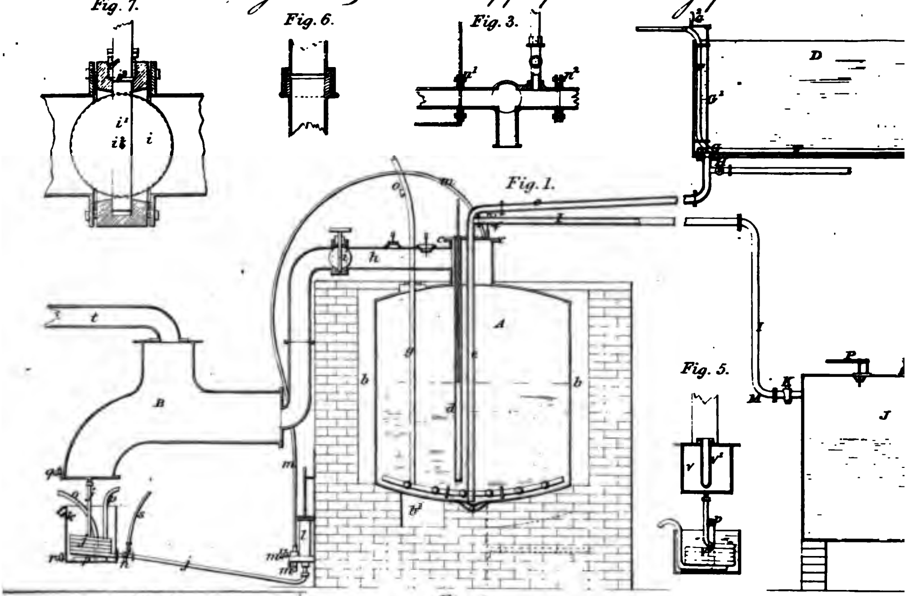


Gwynne & Wilson's app.ts for treating fats.



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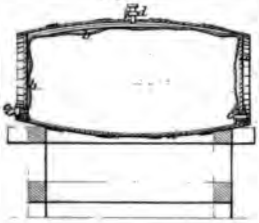

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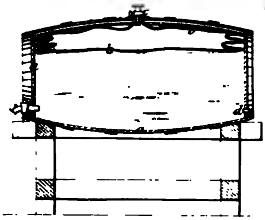

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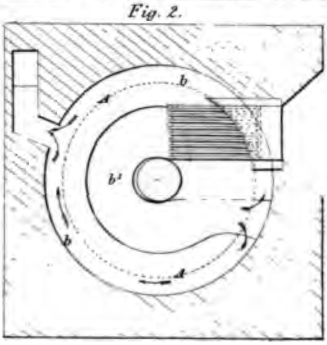

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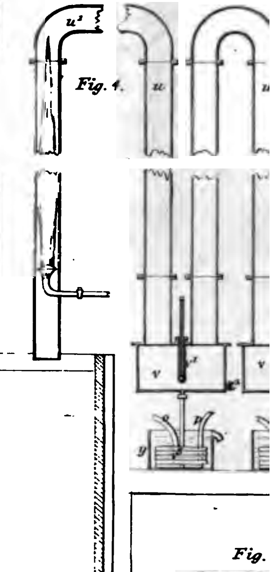
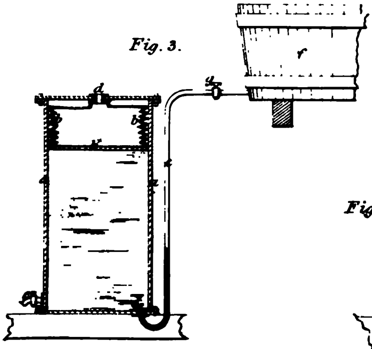


Ryan's app.ts for preserving liquids, &c.

Fig. 3.



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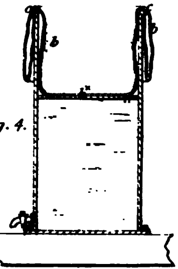

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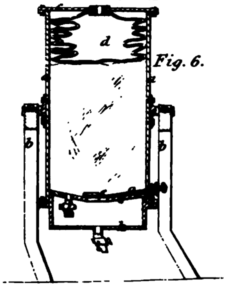

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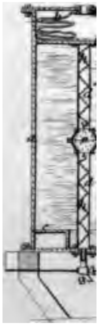
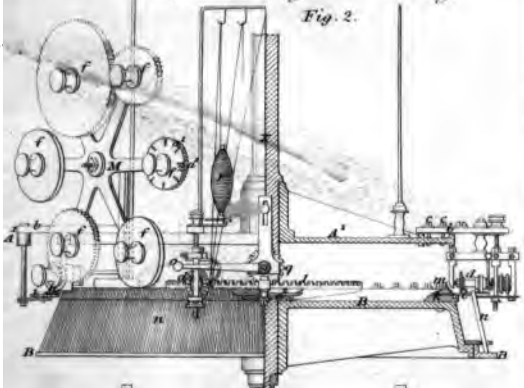


W. Newton del.

1st March 1846.

Brooman's imp.ts knitting machinery.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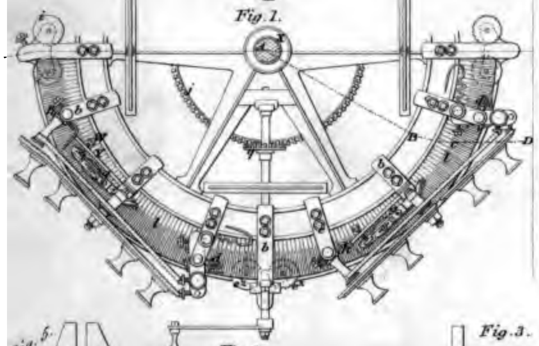
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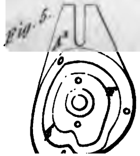
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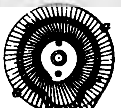
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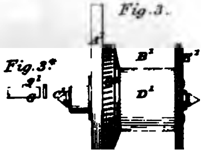
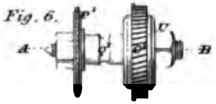


Fig. 3. Fig. 3a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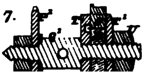
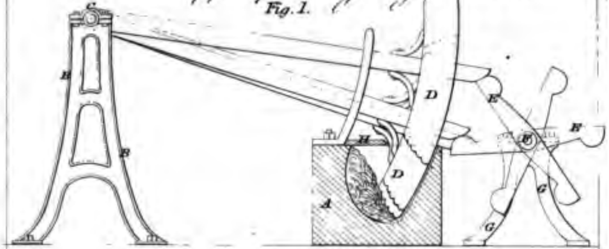


Fig. 7.

Thirion's app.ts for dressing Skins.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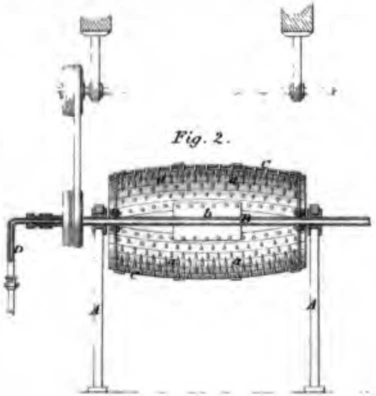
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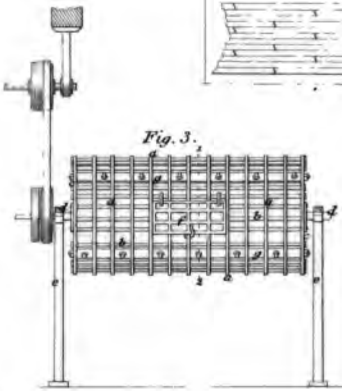
Fig. 3.

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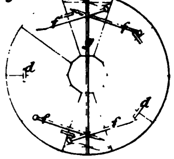
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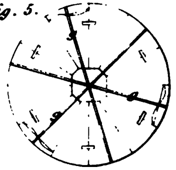
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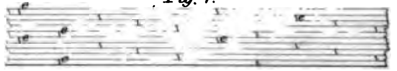
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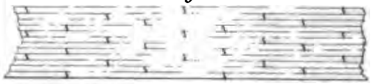
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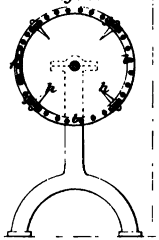
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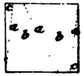
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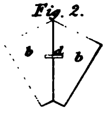
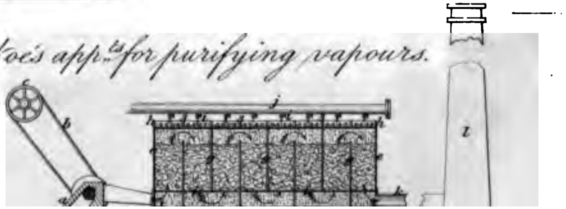
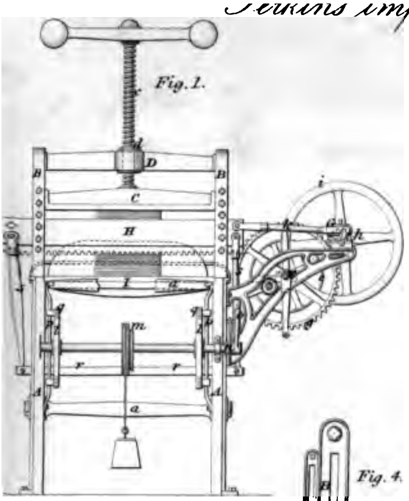


Fig. 2.

Stokoe's app.ts for purifying vapours.



erkins imp.ts in cutting paper.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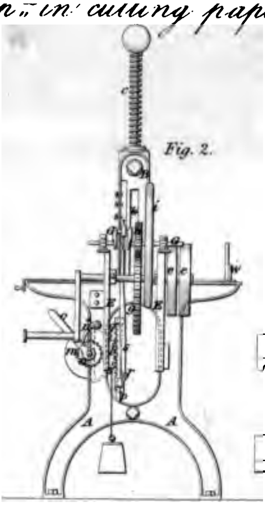
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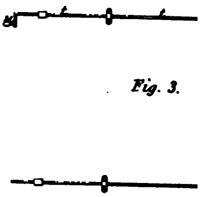
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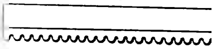
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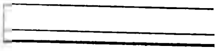
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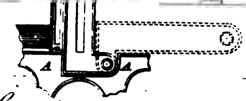
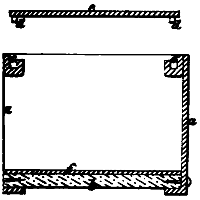
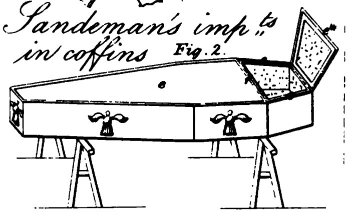


Fig. 4.

Sandeman's imp.ts in coffins

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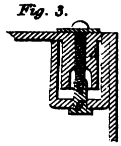
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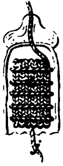
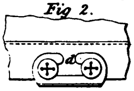


Fig. 4.

Master's trowser fastenings &c.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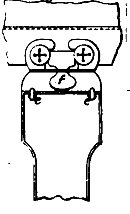
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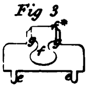
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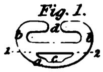
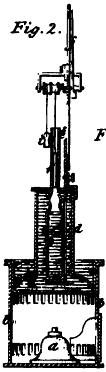


Fig. 1.

Field's imp.d hydromet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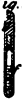
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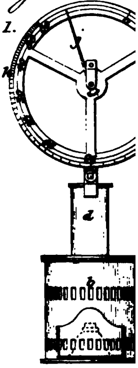
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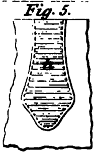
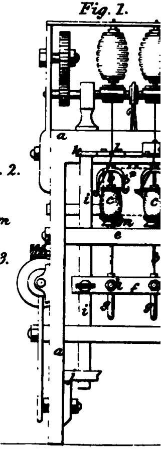


Fig. 5.

Perrier's imp.ts in spinning.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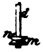
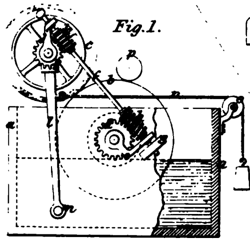


Fig. 2.

Fig. 3.

Haddan's imp.ts in making papier-maché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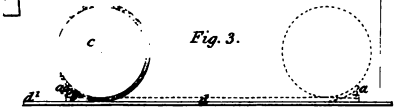
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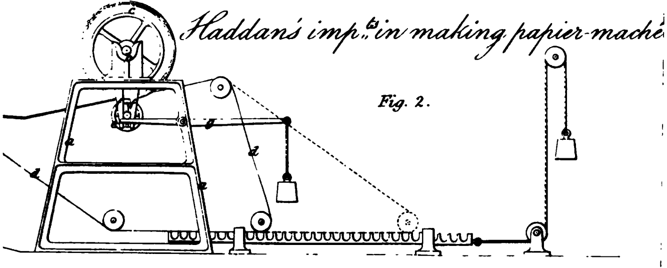
Fig. 2.

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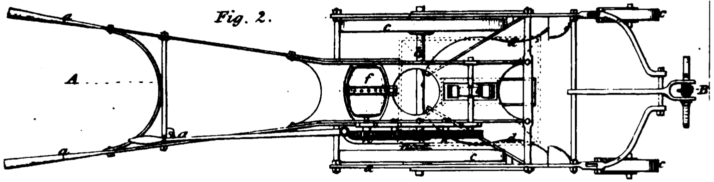
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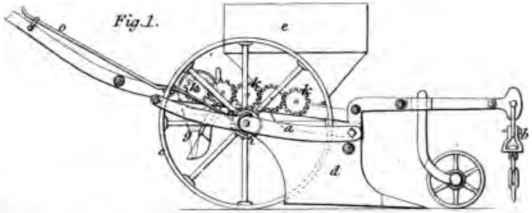
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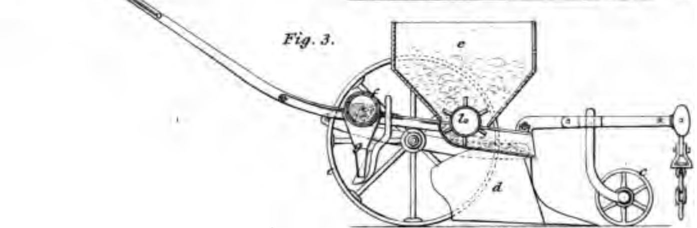
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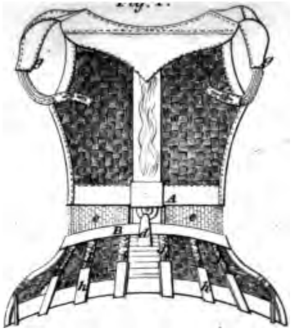

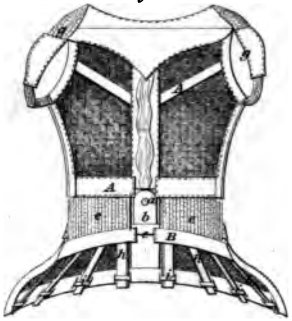
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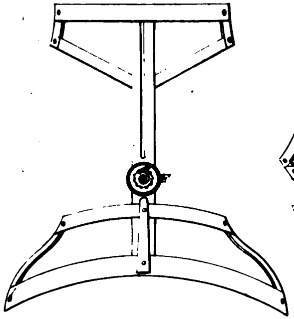
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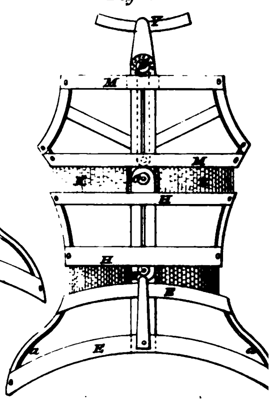
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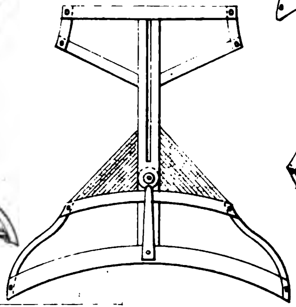
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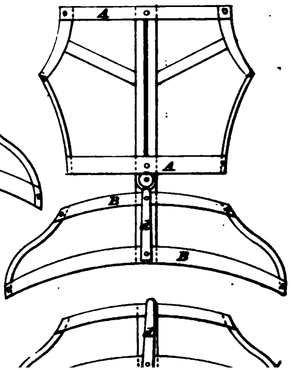
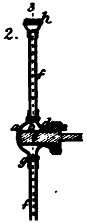


Fig. 3.

Wilson's imp^{d}. carriage wheel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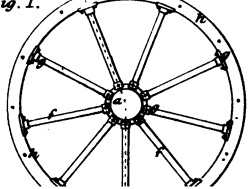
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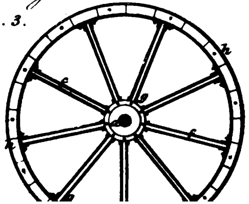
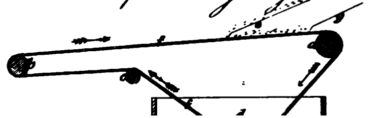


Fig. 3.

Brunton's imp^{ts}. in dreſsing ores.



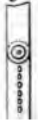


Fig. 4.

Sykes & Ogden's imp.d mach.y for cleaning wool.

Fig. 1

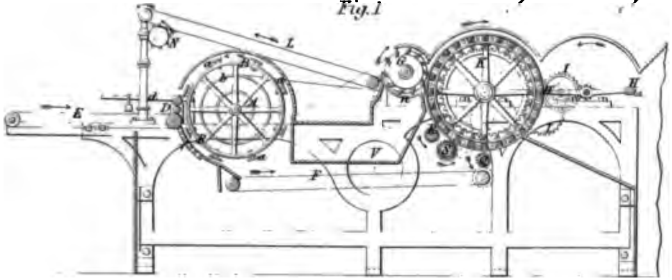
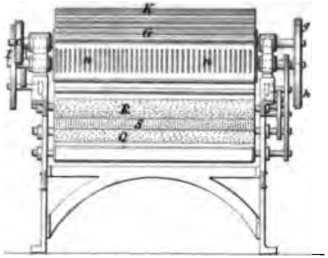


Fig. 3



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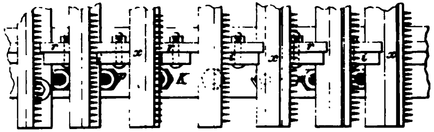


Fig. 6

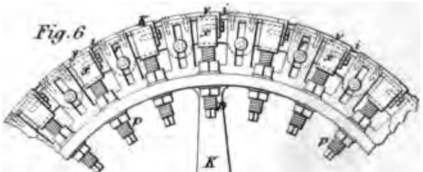


Fig. 9

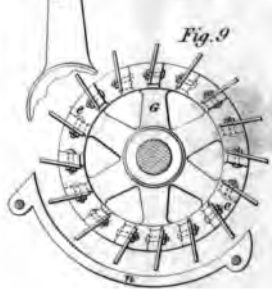
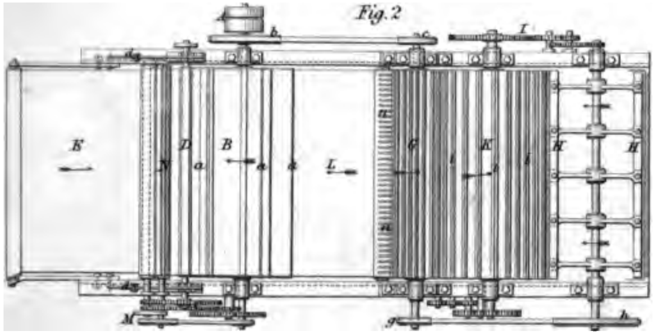


Fig. 2



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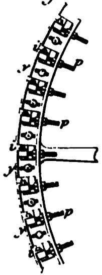

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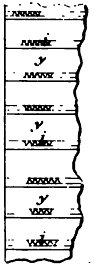

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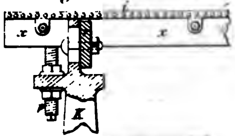

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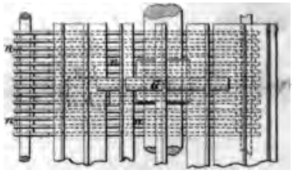
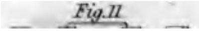


Fig. 11



Howard's imp.ts in rolling iron.

Fig. 2

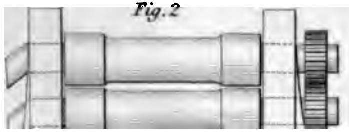


Fig. 1

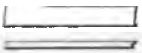


Fig. 3

Poole's imp.d rails.

Fig. 1

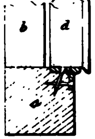
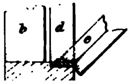


Fig. 2



Bynner's gas burner.

Fig. 1

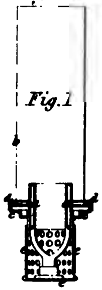
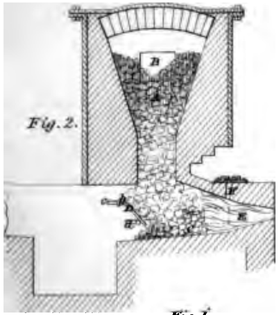


Fig. 2

Hunt's imp.d app.ts for evaporating.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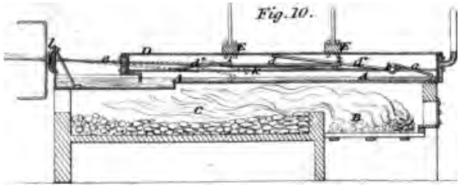


Fig. 10.

Fig. II.

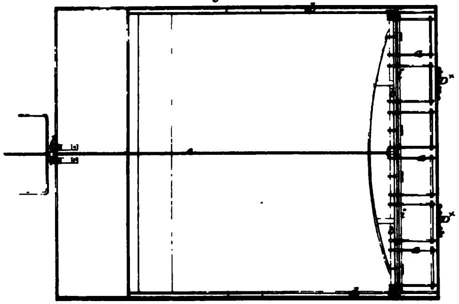
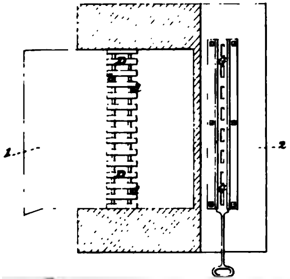


Fig. 1.



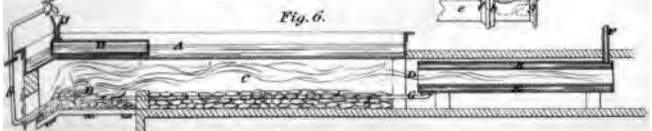


Fig. 6.

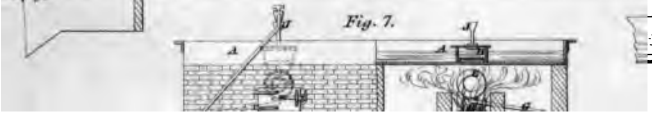


Fig. 7.

enlarged view of rake.

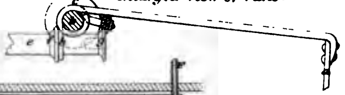


Fig. 5.

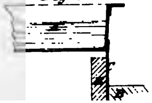
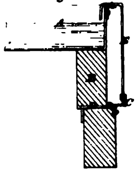


Fig. 3.



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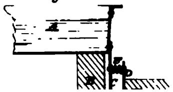


Broman's imp.ts in making cements.

Fig. 3.

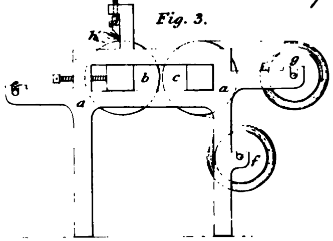


Fig. 2.

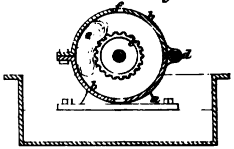
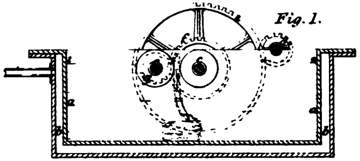


Fig. 1.



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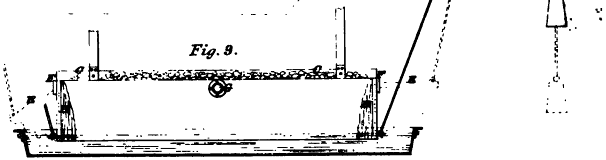

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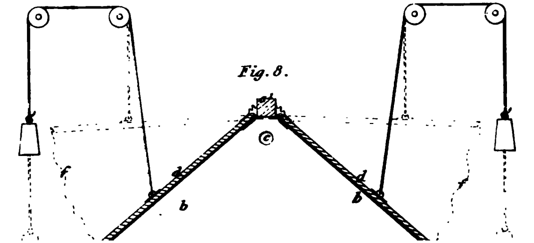
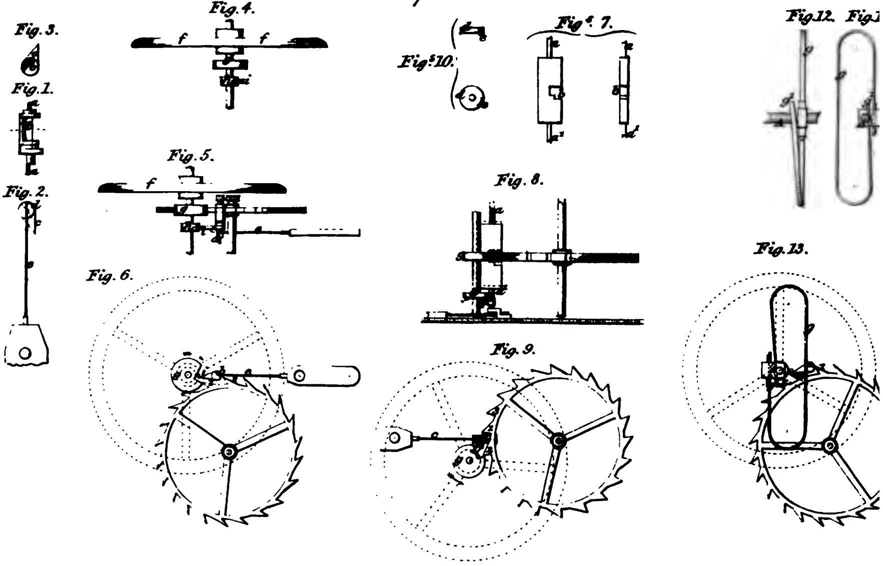
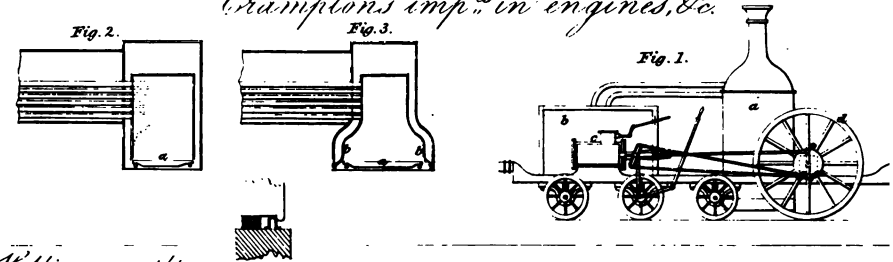


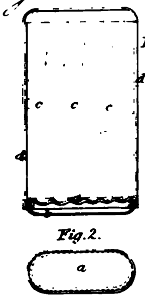
Hanson's imp.ts in watches.



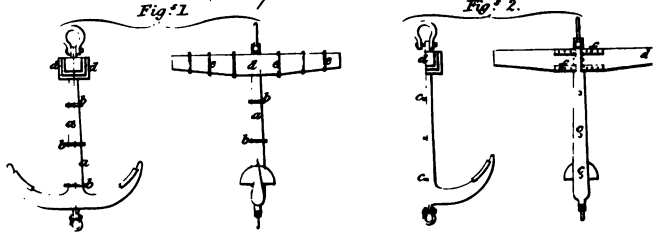
Crampton's imp.ts in engines, &c.

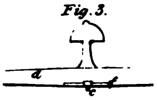


Hollingsworth's cigar case.

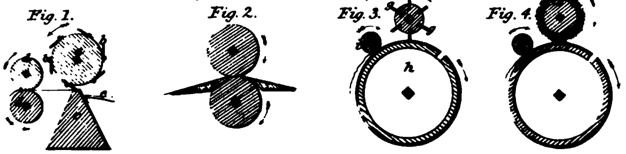


Price's imp.d anchors.





Nossiter's imp.ts in manufact.g leather.



W. Newton del. 1st May 1846. J.E.N

Taylor's impts in sawing timber.

Fig. 1.

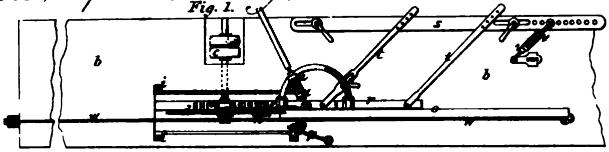


Fig. 4.

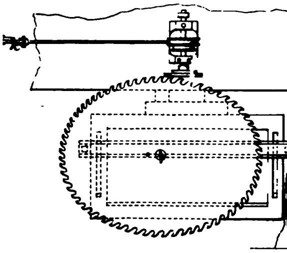
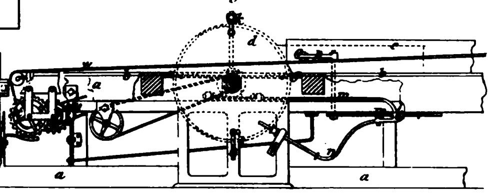


Fig. 2.



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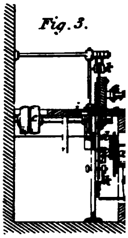


Fig. 5.

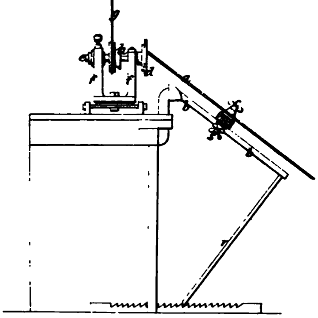
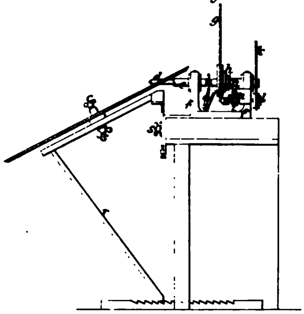


Fig. 7.



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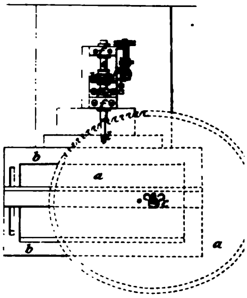


Lawes' impts in atmospheric propulsion.

Fig. 1.

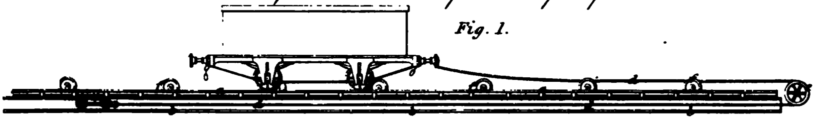
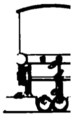


Fig.



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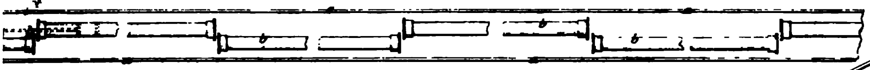


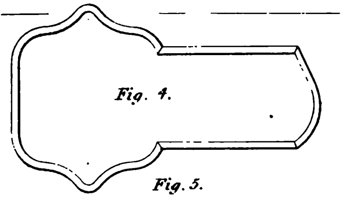
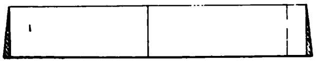


Fig. 5.



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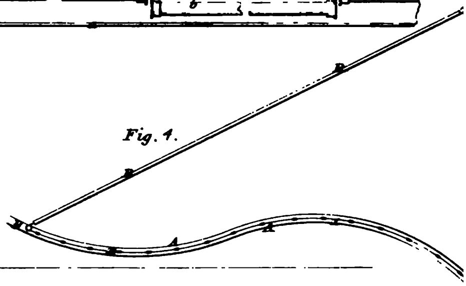


Morgan's impd envelope.

Fig. 1.

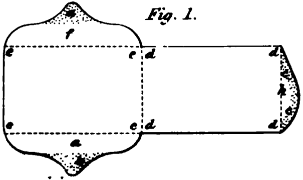
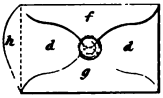


Fig. 2.



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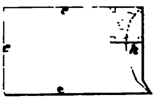
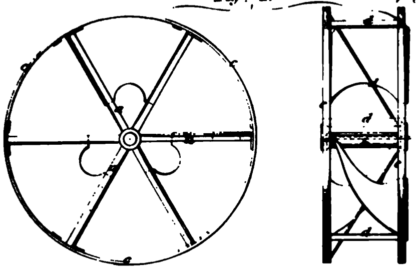


Rosenborg's impts. in steam navigation.

Figs. 1.



Figs. 3.

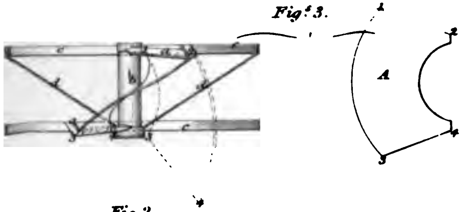


Fig. 2.

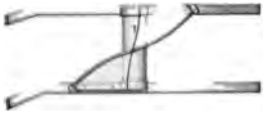


Fig. 6.

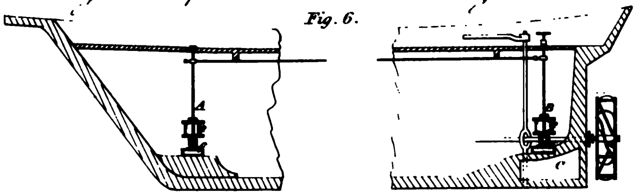


Fig. 5.

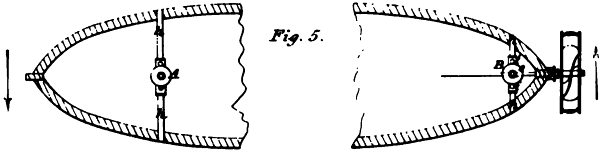
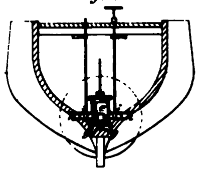
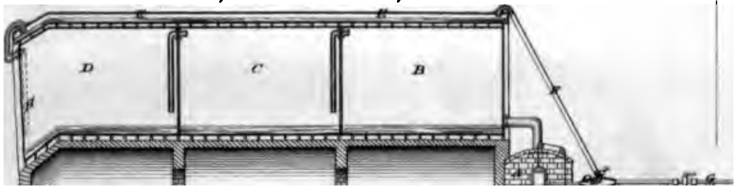


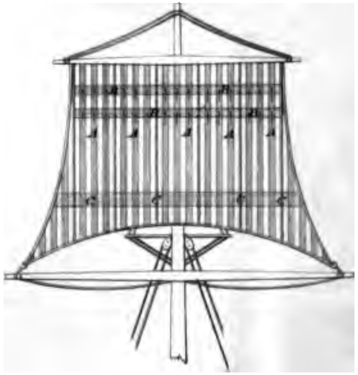
Fig. 4.



Barratt's impts. in manufact.g acids.



Ayres's impd. sail cloth.



Hill's impts. in atmospheric propulsion.

Fig. 2.

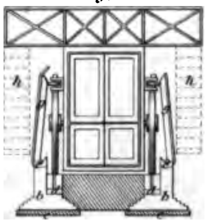


Fig. 3.

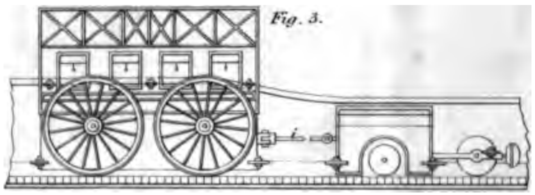
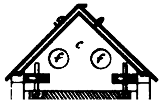


Fig. 1.



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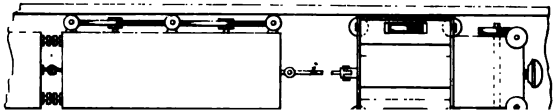
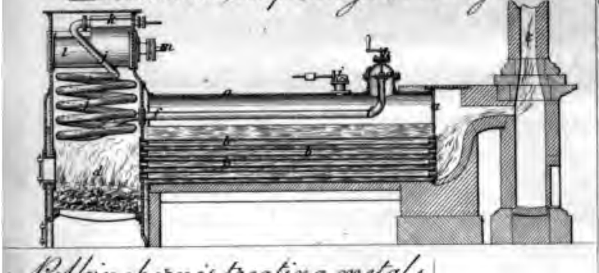
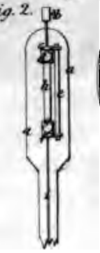


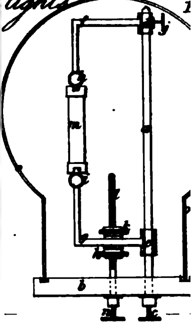
Detmold's imp.ts in generating steam.



King's imp.ts in obtaining light.

Fig. 2.





Polkinghorne's treating metals.

Fig. 1.

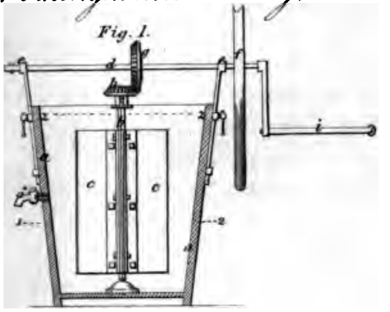
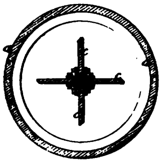


Fig. 2.



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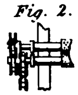
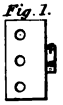


Boydell's imp.ts in hinges.

Fig. 1.



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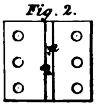

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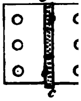

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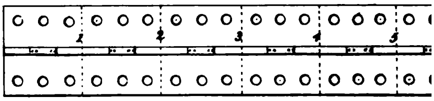
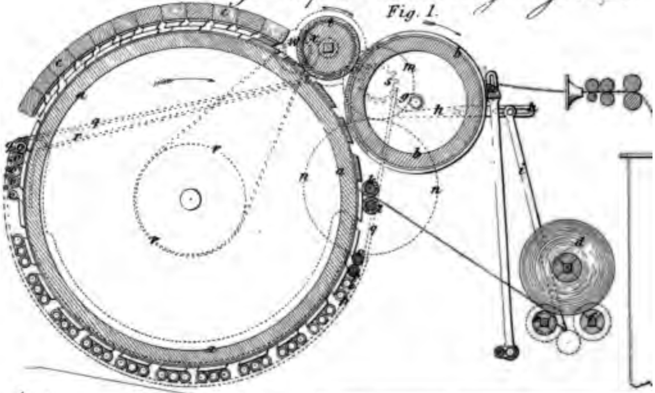
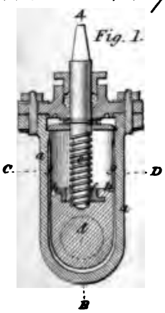


Pooley's improv'd carding engine.

Fig. 1.



Waller's imp.d sluice cocks.



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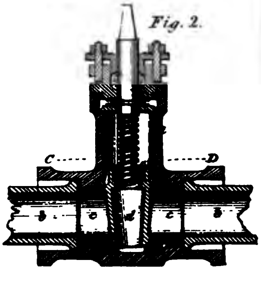

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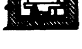
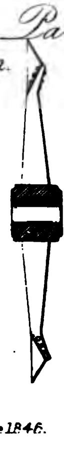


Parlour's propeller.

Fig. 2.



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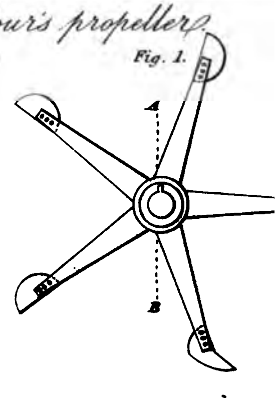

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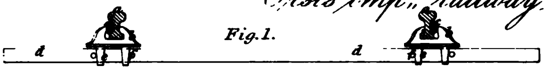
1st June 1846.

Orsi's impd. railway sleepers.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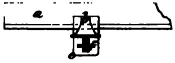
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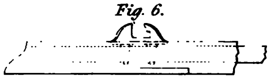
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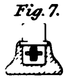
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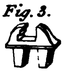
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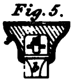
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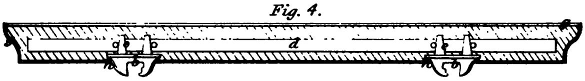
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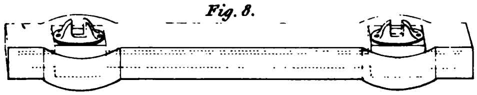
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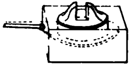
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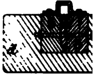
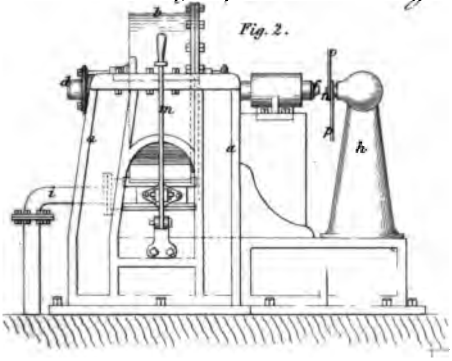


Fig. 10.

Garforth's rivetting machinery.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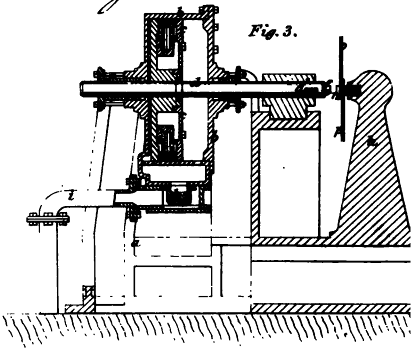
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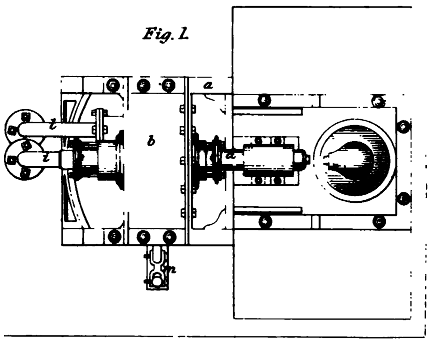
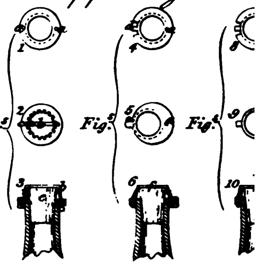


Fig. 1.

Gye's impts. in stoppering bott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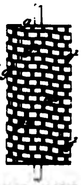
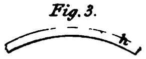


Fig. 6.

Fig. 7.

Fig. 11.

Hale's impts. in cleaning wool.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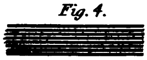
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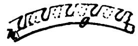
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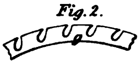
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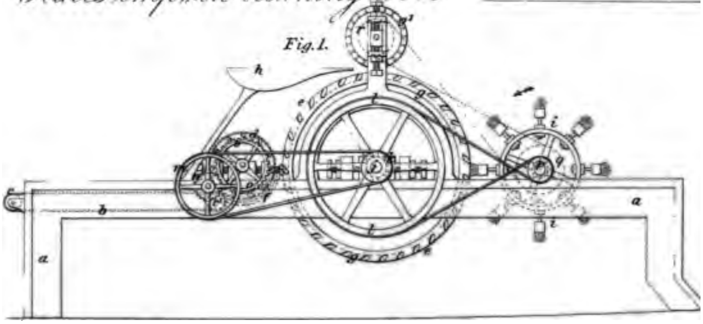
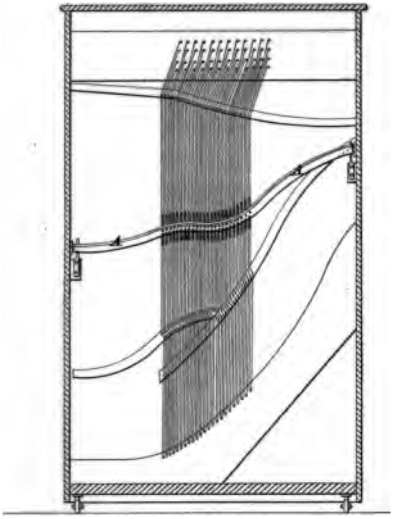


Fig. 1.

Newton del.

Cromwell's imp.ts in piano-fortes.

Fig. 1.



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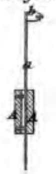

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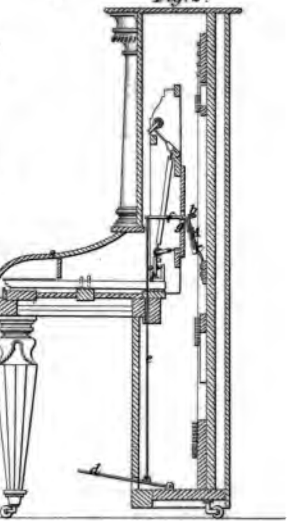

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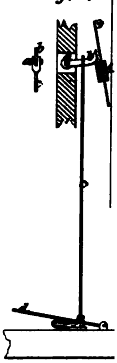

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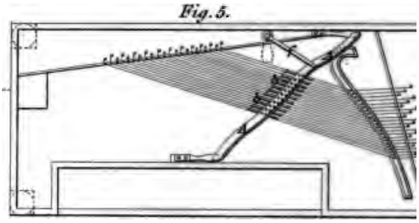

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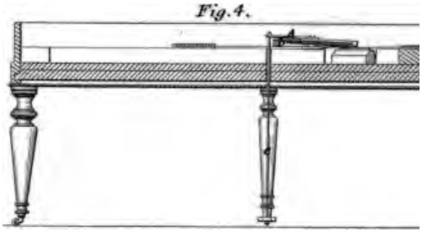
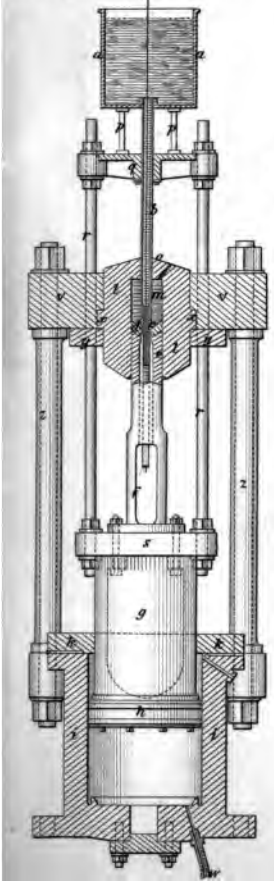


Young & McNair's electric conductors.

Fig. 1.



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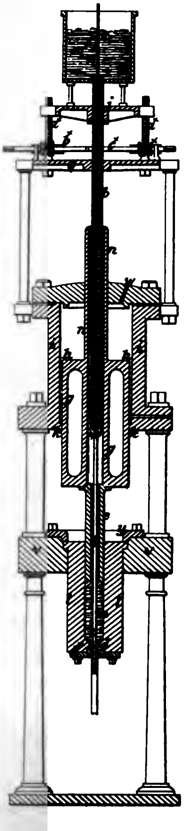

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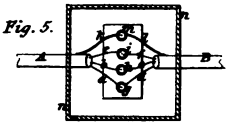

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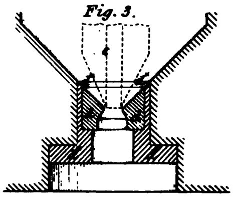

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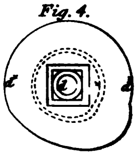

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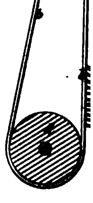

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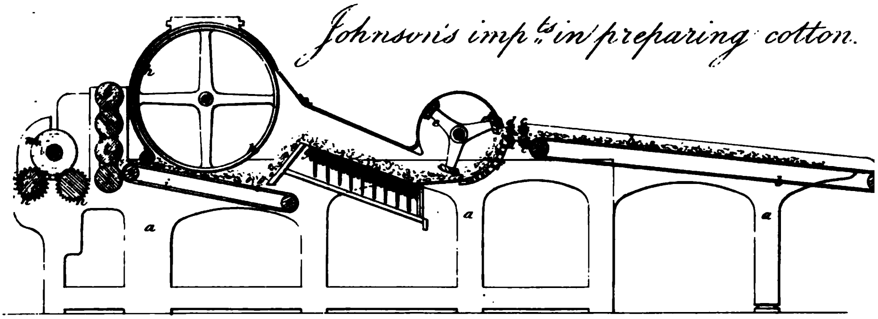
1st July 1846.

Johnson's imp.ts in preparing cotton.



ohnson's imp.ts in making
tmospheric railway tubes.

Fig. 1.

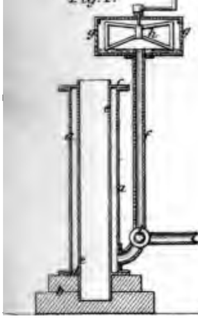
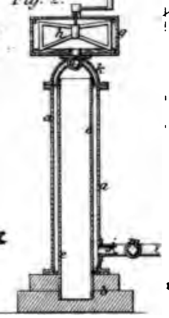


Fig. 2.



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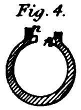

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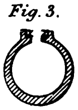


Bell's imp.ts in mak.g sulpuric acid.

Fig. 3.

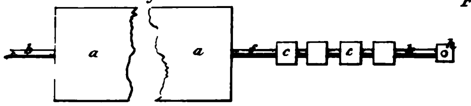
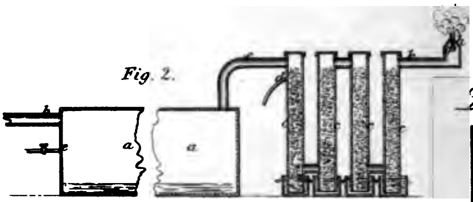


Fig. 1.

Fig. 2.



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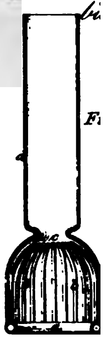
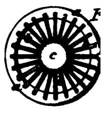
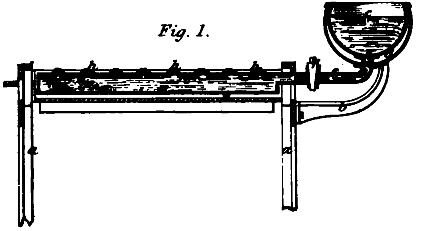




Davies' imp.ts in staining fabrics.

Fig. 1.



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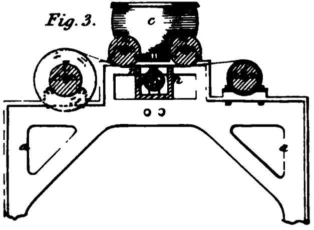

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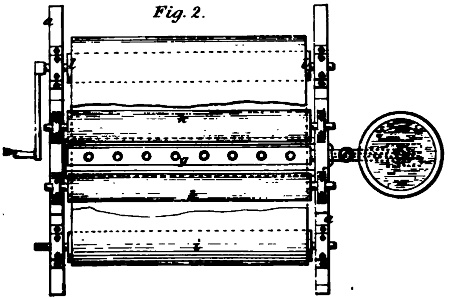
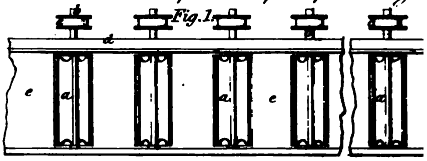


Parkhurst's imp.ts in propelling

Fig. 1.



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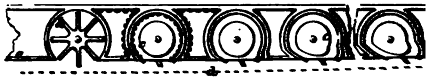

Newton del.

1st July 1846.